SERIAL NO. 3306

ONKYO® SERVICE MANUAL

COMPACT DISC AUTOMATIC CHANGER
MODEL DX-C400

Black model.

BUDN, BUD	120V AC, 60 Hz
BUU, BUUX	110/120/220/240V AC, 50/60Hz

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

ONKYO
AUDIO COMPONENTS

SPECIFICATIONS

Audio Characteristics

Number of Channel	2 (Stereo)
Frequency Response	20 – 20,000 Hz
Signal-to-Noise Ratio	96 dB (at 1 kHz)
Channel Separation	85 dB (at 1 kHz)
Total Harmonic Distortion	0.03% (at 1 kHz)
Wow and Flutter	Below threshold of measurability
Ouptut Level	2 Volts, r.m.s.

Signal Format

Sampling Frequency	88.2 kHz
Quantization	16 Bits
Filter	Two times over sampling Digital Filter + Analogue Filter

Disc

Diameter	120 mm (4-3/4") 500 – 200 rpm (inside – Outside)
Tracking Pitch	1.6 μm
Play Time	60 Min.
Tracking System	Non-Contact Solid State Laser PCM Wavelength 0.79 μm

General

Power Requirements	
USA & Canadian Models	AC 120V, 60 Hz
Worldwide Model	AC 110, 120, 220, 240V switchable, 50/60 Hz
Power Consumption	15 Watts
Dimensions (W x H x D)	435 x 114 x 348 mm 17-1/8" x 4-1/2" x 13-11/16"
Weight	6.4 kg, 14.2 lbs
Supplied Accessories	• Output Signal Cord • Remote Control Transmitter RC-128C • "AA" size (UM-3) battery x 2 • CD Magazine • Instruction Manual

Specifications are subject to change without notice.

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SERVICE PROCEDURES

1. Safety-check out

After correcting the original service problem, perform the following safety check before releasing the set to the customer:

Connect the insulating-resistance tester between the plug of power supply cable and chassis.

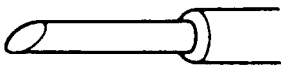
Specifications: more than 10Mohm at 500V.

2. Procedures for replacement of flat packaged ICs

1. Tools to be used:

(1) Soldering iron . . . . Grounded soldering iron or soldering iron with leak resistance of 10 Mohms or more.

Form of soldering iron's tip:



(2) Magnifying glass . . . for checking of finished works

(3) Tweezers . . . . . for handling of IC and forming of leads

(4) Grounding ring . . . . Countermeasure for electrostatic breakdown

(5) Nipper . . . . . for removing defective IC

(6) Small brush . . . . . for application of flux

(7) Enamel line

2. Work Procedures:

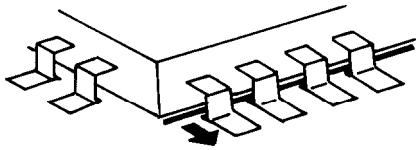
(1) Remove the defective IC

(A) Cut all leads of the defective IC one by one using a nipper and remove the IC.

(B) 1. An enamel line has been pierced between the legs of the flat package IC.

2. Use a soldering iron to unsolder the legs one at a time.

3. Repeat the procedure of 1 and 2 above for the 3 sides only.



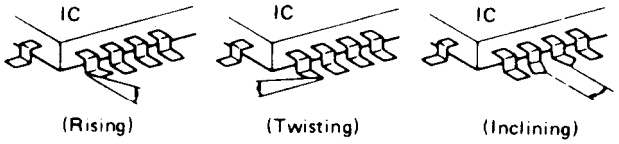
While holding the soldering against the enamel line, pull in the direction of the arrow.

(2) Clean the pattern surface of the PC board.

Get rid of the remaining leads and solder.

(3) Check and from the leads of the new flat packaged IC to be installed.

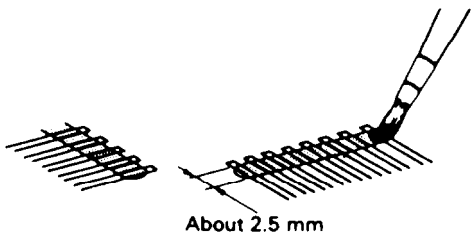
From every lead on the new IC using a pair of tweezers, so that all of them are aligned neatly without being risen, twisted or inclined toward one side. Especially the rising portion of every lead must be formed with greatest care.



(4) Apply flux to the PC board.

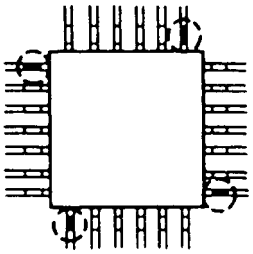
Apply flux to the pattern surface of the PC board which has been cleaned, as shown in the illustration. The area to be applied with flux is the portion of about 2.5mm in width where the IC's leads are to be soldered.

Be careful to apply minimum amount of flux required so as not to smear it on unwanted areas.



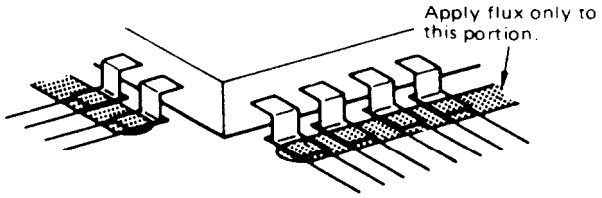
(5) Temporarily tighten the IC

Carefully align the pattern and IC's leads, so that the IC will be temporarily tightened to the pattern on the four leads at the corners. At this time, soldering is required, but no need to apply soldering material.



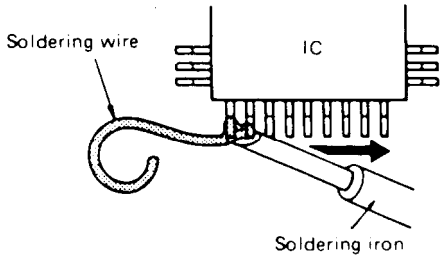
(6) Apply flux to IC's leads

Apply flux to the areas of IC's leads where soldering is to be performed. Be careful not to smear flux on the root portion of any lead or the body of IC.



(7) Soldering

While attaching the tip of the soldering iron to the soldering point as shown in the illustration, feed 2 –5mm of soldering wire. Then, slowly move the iron in the direction indicated by the arrow in the illustration, so that the leads will be soldered to the pattern. Move the iron in the rate of approximately 1cm in 5sec. Proceed with your work while confirming a clean fillet of solder is formed on each lead, subsequent to the melting of flux.



CAUTION

1) If you move the iron too quickly, loose soldering is likely to result.
2) Be especially careful when soldering the first lead where loose soldering is most liable to be formed.

(8) Check the results

When soldering of all leads is finished, check the soldered portion on every lead with a magnifying glass. A tester must not be used or checking of any soldered position

NOTE ON COMPACT DISC

- **Holding Compact Discs**

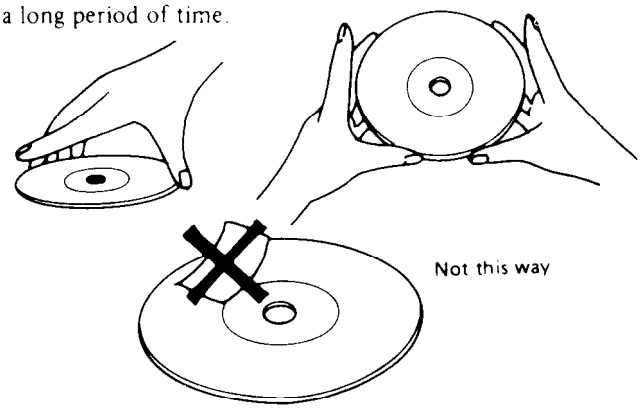
Hold Compact Discs by the edges so that you do not touch the surface of disc. Remember that the side of the disc with the "rainbow" reflection is the side containing the audio information.

Do not attach tape or paper to the label side of the disc and always be careful not to leave fingerprints on the side that is played.

- **Storing Compact Discs**

Store Compact Discs in a location protected from direct sunlight, high heat and humidity and extremely high and low temperatures. Discs should never be left in the trunk or interior of an automobile in the sun since the temperature can become very high in such a closed environment.

Always store Compact Discs in the holders in which they were sold. Never leave a disc in the player's disc holder for a long period of time.



- **Cleaning Compact Discs**

Before playing a disc wipe off the playing surface with a soft cloth to remove dust and other soil. Wipe the surface in straight lines from the center of the disc outward, not in a circular motion as you would with a phonograph record.

Do not use benzene, chemical cleansers or phonograph record cleaning solutions to clean Compact Discs. Also avoid static electricity prevention solutions since they can damage the surface of Compact Discs.

Problems Caused by Dew

Dew can form inside a Compact player when it is brought from a cold environment into a warm room, when a room is rapidly heated and if a player is left in a humid environment.

This dew can prevent the laser pickup from reading the data contained in the pits in the disc surface. If the player does not operate properly because of dew, remove the disc and leave the player's power switch on for about one hour to remove all moisture.

PROTECTION OF EYES FROM LASER BEAM DURING SERVICING

This set employs a laser. Therefore, be sure to follow carefully the instructions below when servicing.

WARNING!!

WHEN SERVICING, DO NOT APPROACH THE LASER EXIT WITH THE EYE TOO CLOSELY. IN CASE IT IS NECESSARY TO CONFIRM LASER BEAM EMMISION, BE SURE TO OBSERVE FROM A DISTANCE OF MORE THAN 30cm FROM THE SURFACE OF THE OBJECTIVE LENS ON THE OPTICAL PICK-UP BLOCK.

Laser Diode Properties

- Material: GaAS/GaAlAs
- Wavelength: 790nm
- Emission Duration: continuous
- Laser output: max. 0.2mW*

  *This output is the value measured at a distance about 2mm from the objective lens surface on the Optical Pick-up Block.

CERTIFICATION LABEL

This label is located on the back panel.

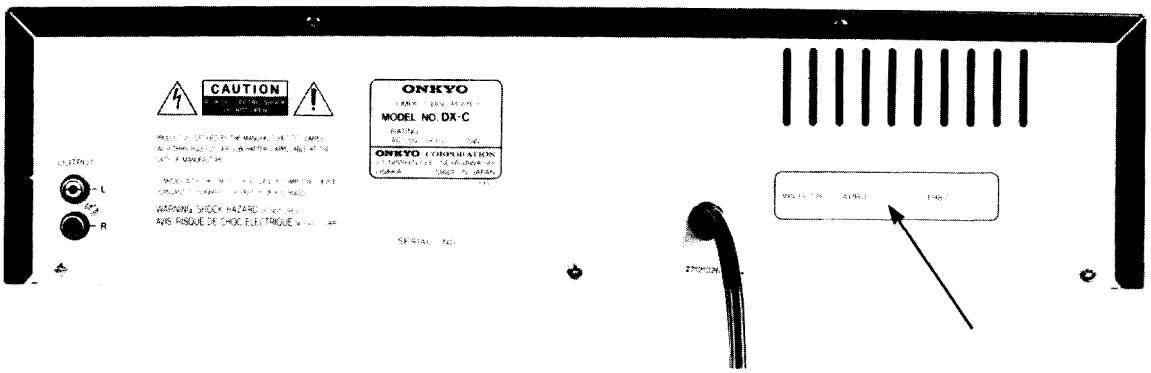


Photo 1

CAUTION ON REPLACEMENT OF PICK-UP

The laser diode in the optical pick-up block is so sensitive to static electricity, surge current and etc. that the components are liable to be broken down or its reliability remarkably deteriorated.

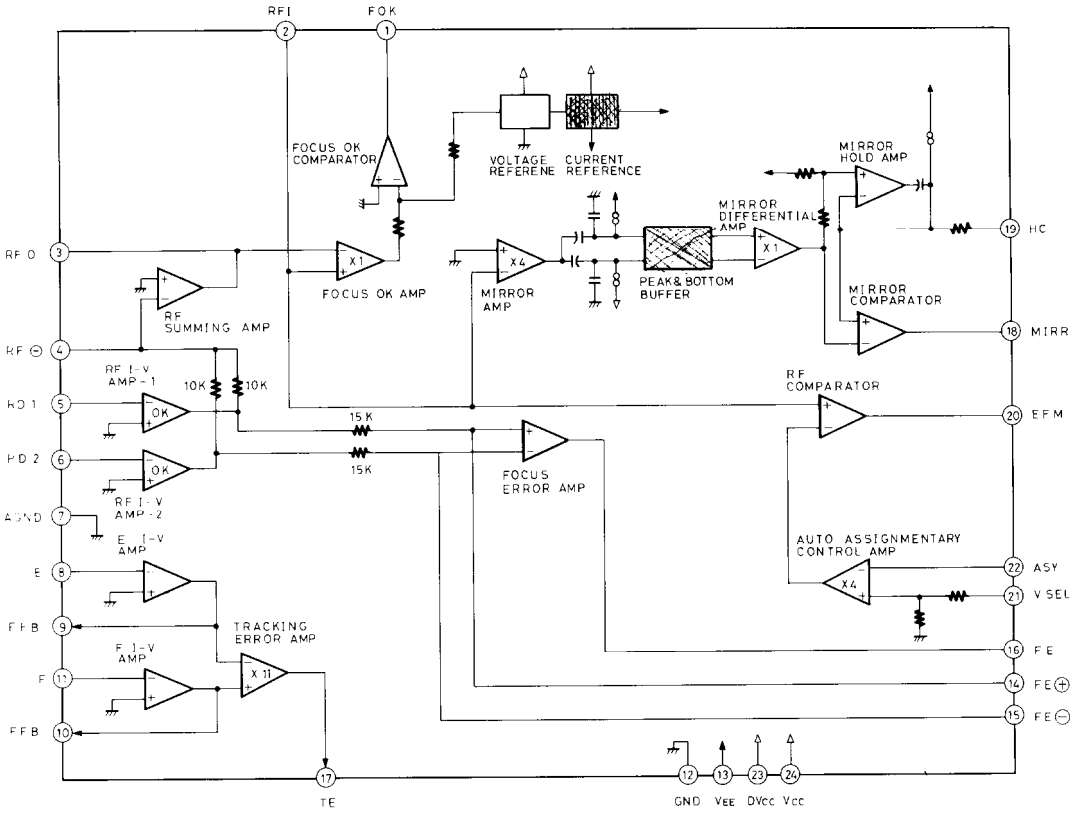
During repair, carefulley take the following precautions. (The following precautions are included in the service parts).

PRECAUTIONS

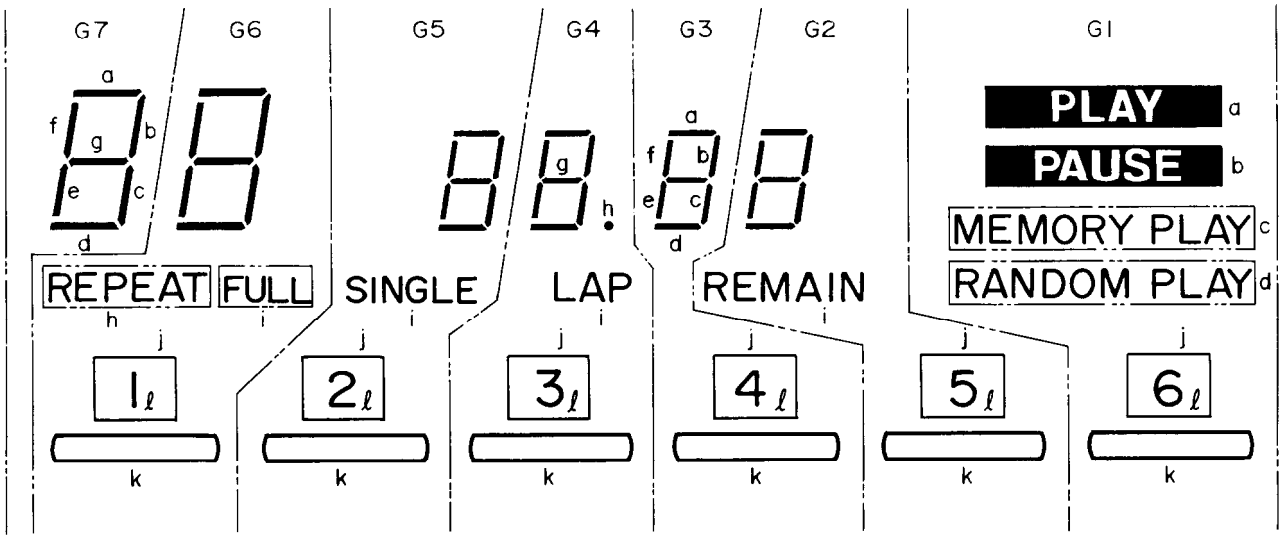
1. **Ground for the work-desk.**
   Place a conductive sheet such as a sheet of copper (with impedance lower than $10^6\Omega$) on the work-desk and place the set on the conductive sheet so that the chassis.
2. **Grounding for the test equipment and tools.**
   Test equipments and toolings should be grounded in order that their ground level is the same the ground of the power source.
3. **Grounding for the human body.**
   Be sure to put on a wrist-strap for grounding whose other end is grounded.
   Be particularly careful when the workers wear synthetic fiber clothes, or air is dry.
4. **Select a soldering iron that permits no leakage and have the tip of the iron well-grounded.**
5. **Do not check the laser diode terminals with the probe of a circuit tester or oscilloscope.**

IC BLOCK DIAGRAM AND DESCRIPTIONS

CX20109 (RF amplifier)



CPF2331GR (fluorescent tube)

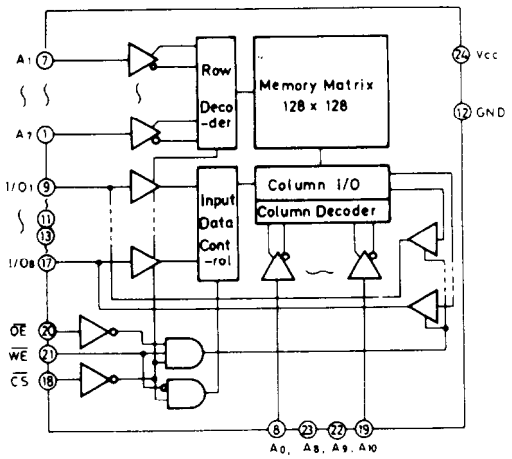


Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Connection	F	F	G7	G6	Pe	Pg	G6	Pf	G5	Ph	Pi	G5	Pk	G4	NP	NP	G4	G3	NP	NP

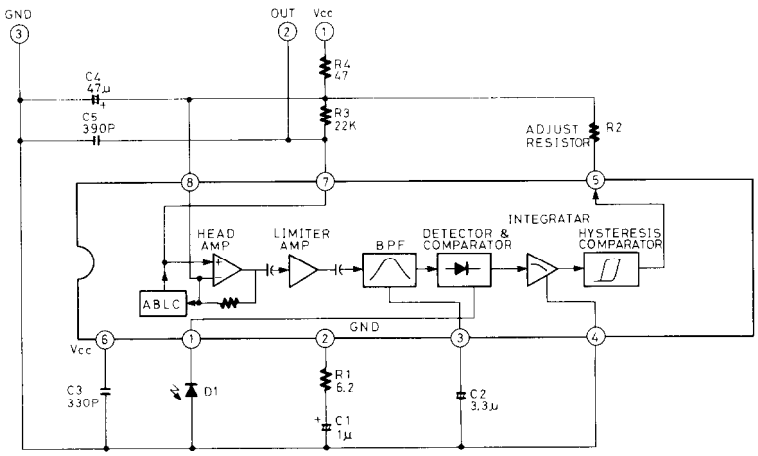
Pin No.	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Connection	G3	Pj	G2	Pl	Pd	G2	Pa	G1	Pb	Pc	G1	NP	F	F

F : Filament
G : Grid
P : Anode
NP : No pin

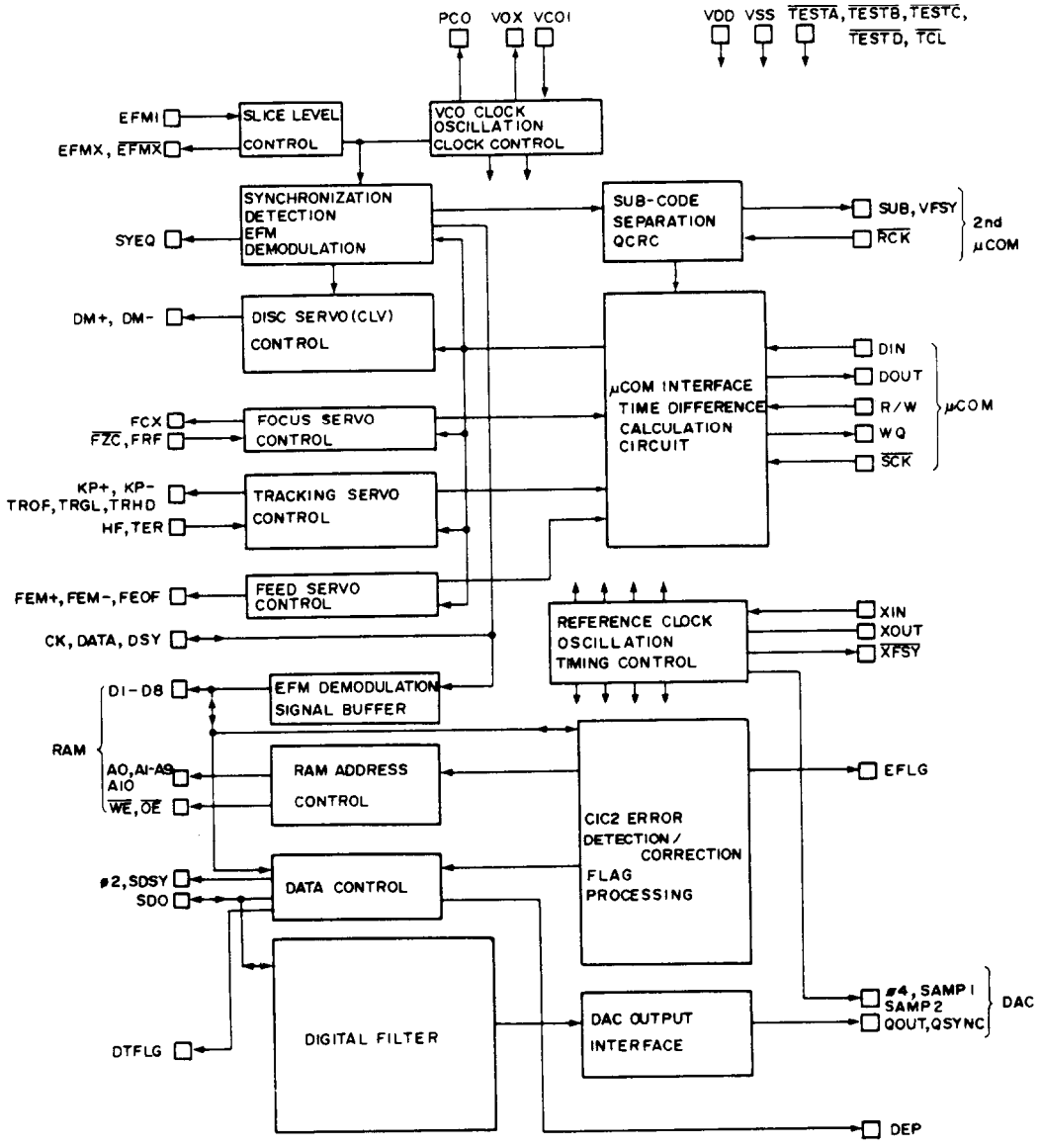
LC3517AM-15 (RAM)

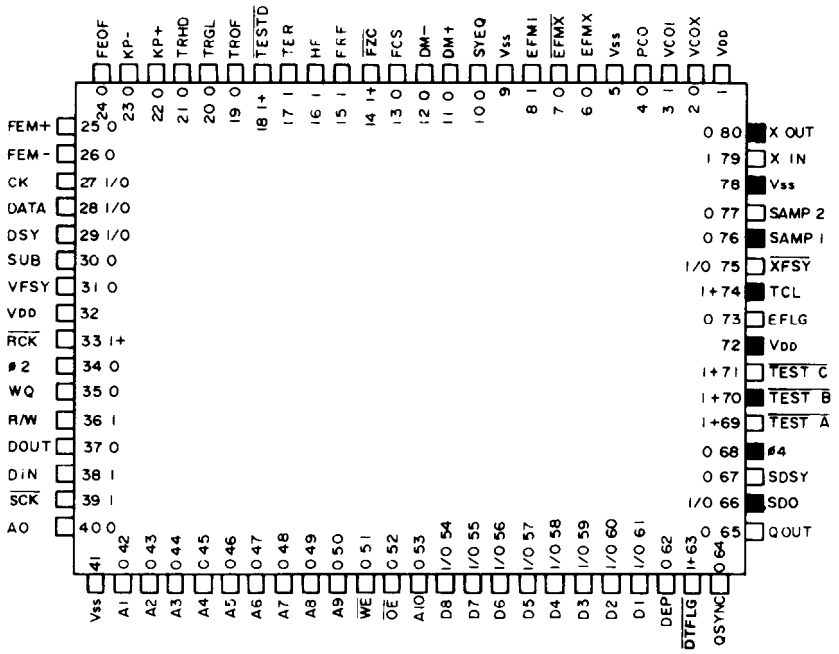


BX1407 (remote control sensor)



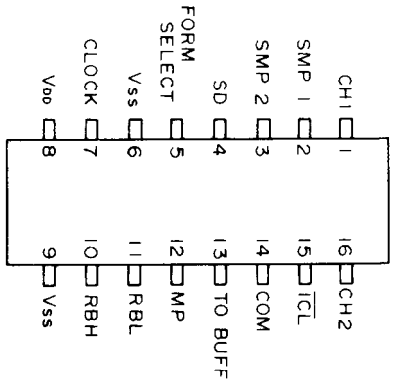
YM3805 (Signal processor & controller)




FEOF KP- KP+ TRHD TRGL TROF TESTD TER HF FRF FZC FCS DM- DM+ SYEQ Vss EFMI EFMX EFMX Vss PCO VCOI VCOX VDD
FEM+ FEM- CK DATA DSY SUB VFSY VDD RCK ϕ2 WQ R/W DOUT DIN SCK A0
X OUT X IN Vss SAMP 2 SAMP 1 XFSY TCL EFLG VDD TEST C TEST B TEST A ϕ4 SDSY SDO QOUT
Vss A1 A2 A3 A4 A5 A6 A7 A8 A9 WE OE A10 D8 D7 D6 D5 D4 D3 D2 D1 DEP DTFLG QSYNC

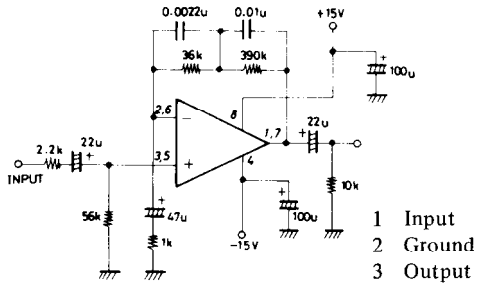
Pin No.	Designation	Function
79, 80	79 x IN and 80 x OUT	Clock Oscillator (8.6436MHz)
6~8	8 EFMI, 7 $\overline{\text{EFMX}}$, and 6 EFMX	EFM External Circuit
2~4	4 PCO, 3 VCO1, 2 VCOX	Clock Regeneration Circuit
10	SYEQ	WYNC Match Signal
27~29	27 CK, 28 DATA, and 29 DSY	FM Demodulation Signal Check Output
30, 31, 33	30 SUB, 31 VFSY, and 33 $\overline{\text{RCK}}$	Sub-code Output
35~37, 39	35 WQ, 36 R/W, 37 DOUT, and 39 $\overline{\text{SCK}}$	Q-code Output related Pins
36, 38, 39	36 R/W, 38 DIN, and 39 $\overline{\text{SCK}}$	μ COM Command related Pins
13~15	Input 14 $\overline{\text{FZC}}$ – 15 FRF, and Output 13 FCS	Focus Servo-mechanism related Pins
11, 12	11 DM+, and 12 DM–	Disc Servo-mechanism Pins
16, 17 19~23	Input 16 HF, and 17 TER Output 19 TROF, 20 TRGL, 21 TRHD, 22 KP+, and 23 KP–	Tracking Servo-mechanism related Pins
24~26	24 FEOF, 25 FEM+, and 26 FEM–	Feed Servo-mechanism related Pins
40, 42~61	40A0–53A10, 51 $\overline{\text{WE}}$, 52 $\overline{\text{OE}}$, and 54D8–61D1	RAM Connection
75	75 $\overline{\text{XFSY}}$	Crystal Clock SYNC Signal
73	73 EFLG	C1 and C2 Error Correction Check Signal
34, 66, 67 69, 71, 63	34 ϕ2, 66 SDO, SDSY, 63 DTFLG 69 $\overline{\text{TEST A}}$, and 71 $\overline{\text{TESTC}}$	DATA Control Circuit-Serial Signal Output
64, 65 68, 76, 77	65 Q OUT, 64 Q SYNC, 76 SAMP1, 77 SAMP, 2 and 68 ϕ4	DAC Interface
62	62 DEP	De-emphasis Signal
8, 18 69~71	69 $\overline{\text{TEST A}}$, 70 $\overline{\text{TEST B}}$, 71 $\overline{\text{TEST C}}$, 18 $\overline{\text{TEST D}}$, and 8 $\overline{\text{TCL}}$	Test Pins

YM3020 (D/A converter)



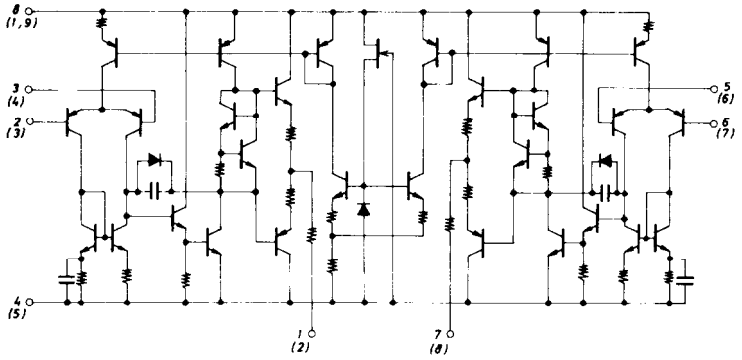
Pin No.	Designation	Function (Assignment)
1.	V OUT CH1	Sample-hold analog switch output for Channel 1.
2.	SMP 1	Interval of signal at state "1" will be the sampling time of CH1.
3.	SMP 2	Interval of signal at state "1" will be the sampling time of CH2. The rising edge of SMP 1 and SMP 2 is used to generate the internal signal to latch the serial data. The level frequency characteristics will be improved as the signal time of SMP 1 and SMP 2 becomes longer.
4.	SD	Serial input of converted digital signal.
5.	FORM SELECT	Corresponds to binary input at state "1", and corresponds to 2's complement input at state "0".
6.	V_{SS}	Low-potential side power (GND).
7.	CLOCK	Clock to drive shift-resistor and time-generator ($\phi 4$).
8.	V_{DD}	High-potential side reference power.
9.	V_{SS}	Low-potential side reference power (GND).
10.	RBH	Since the same resistance is inserted between the RBH pin and the internal V_{DD} power supply and between the RBL pin and the internal V_{SS} (GND) power supply, a high precision voltage of 1/2 V_{DD} can be obtained when both pins are connected. This voltage is applied on the MP pin through the buffer operational amplifier.
11.	RBL	As in the case of the basic circuit, the drift from 1/2 V_{DD} can be corrected by providing an appropriate external resistance on either one of the two pins.
12.	MP	An exponential analog shift is executed with the potential applied on MP as the reference. Normally, bias is appoied for 1/2 V_{DD}.
13.	TO BUFF	Analog output of DAC is input to buffer operational amplifier.
14.	COM	Common input of analog switch for CH1 and CH2.
15.	ICL	"1": Normal operation. "0": Will become no-signal output regardless of D signal.
16.	V_{OUT} CH2	Sample-hold analog switch output for CH2.

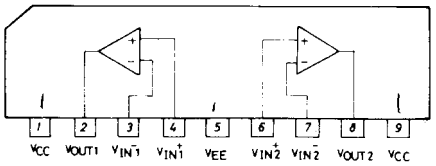
PST529E-2 (Reset)



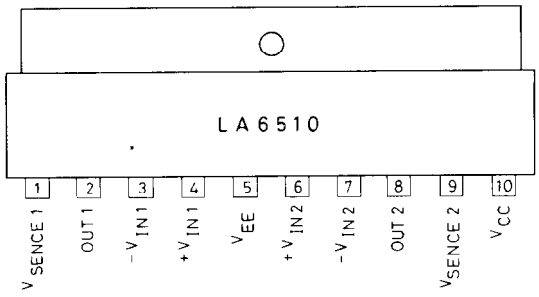
1 Input
2 Ground
3 Output

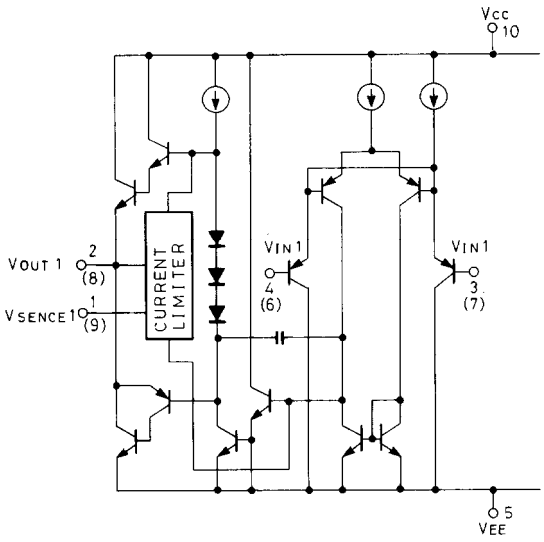
LA6462S (Opamp.)



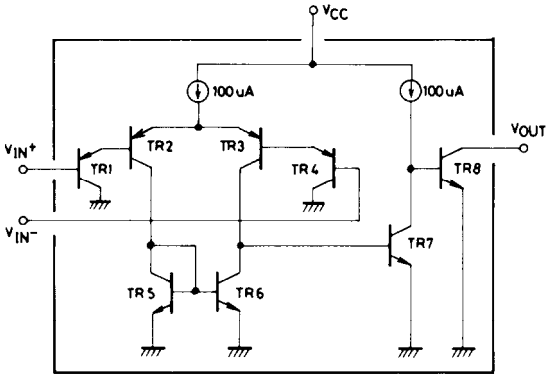


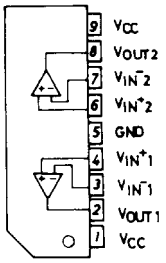
LA6510 (Power opamp.)





LA6393S (Comparator)





CIRCUIT DESCRIPTIONS

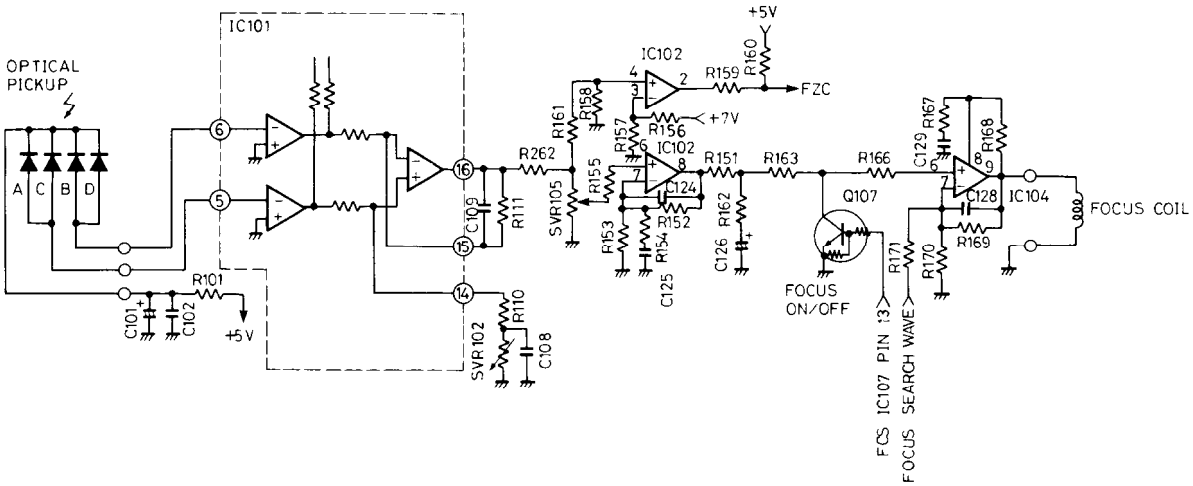


Fig. 1

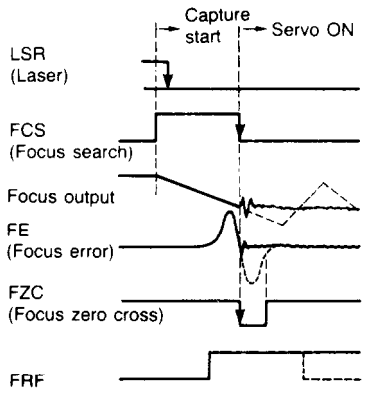


Fig. 2

1.Focus Servo Circuit

The focus servo ensures that the laser beam emitted by the optical pickup is always focused on the reflective surface of the disc.It does this by moving the optical pickup's objective lens in response to oscillations in the disc surface.

1-1.Focus Error Detector

The detector obtains the difference between the signals produced by the diagonal elements of a four-section photodiode housed in the pickup and utilizes an astigmatic method to detect focusing errors.

F.E.(focus error)=(A+C)-(B+D)

(A - C) and (B - D) are input into pin 5 and pin 6 of IC101 respectively. The FE signal is calculated by the three opamps in IC101 and output via pin 16.

1-2.Phase Correctors-Drivers

The focus error signal passes from IC101 pin 16 to IC102 pin 6 to IC102 pin 8 to IC104 pin 6 to IC104 pin 9 and drives the pickup focus coil.IC104 is the coil driver power opamp.

C125,C126 and C124 are phase correctors which enhance the servo's stability. Semi-fixed resistors SVR102 and SVR105 are used to regulate balance and gain in the servo circuitry.Q107 transistor switch turns the servo loop on and off.Control is mainteined by means of the FCS signal are from microprocessor IC107 pin 13.

1-3.Focus search circuit

The focusing servo's capture range is only approximately 10μm,so,when the objective lens is being moved up and down, the above-mentioned servo on/off switch must be controlled to close the loop when the point of focus of the laser beem is positioned precisely.

When start, FCS signal(integrating wave) is passed via R171 to IC104 pin 7 and shifts the object lens up and down.As a result, FE signal figures the sine curve.

The zero cross point(reference voltage is determined by R157 and R156) is the just focus point.

FZC signal(IC 102 pin 2) falls when the zero cross point is detected.According to this timing, FCS(IC107 pin 13) changes to LOW,and Q107 transistor switch shuts off, closing the servo loop.

Fig.2 illustrates the timing.The dottod lines show the waveforms produced by focus capture errors.

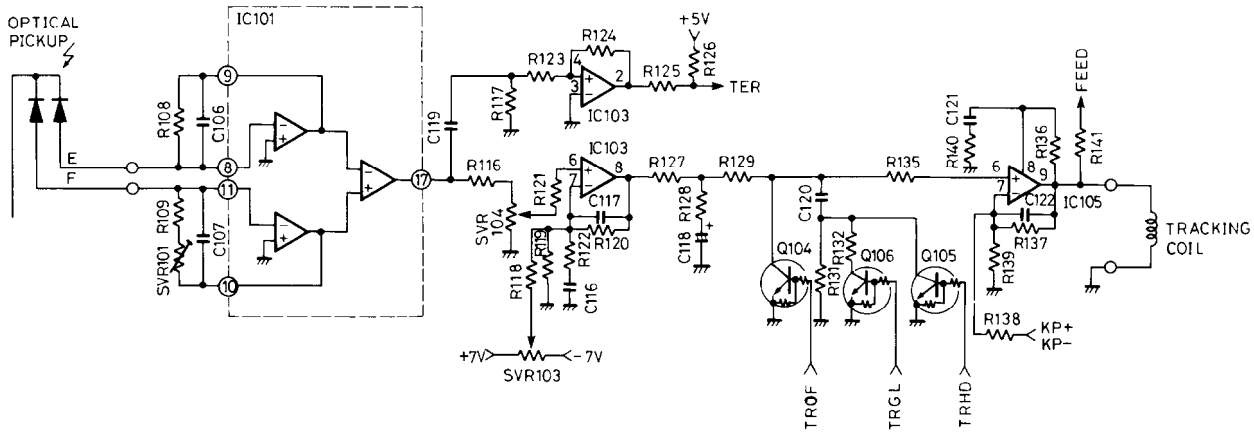


Fig. 3

2.Tracking Servo Circuit

This control circuit moves the objective lens radially to keep the laser beem precisely centered in the tracks on the disc surface (wich are only 1.6μm wide).

2-1.Tracking Error Detector

This unit uses a three-beam laser pickup.The error signal is obtained from the difference between the E and F output from both sides of a four-section photodiode housed in the pickup.

T.E.(tracking error)=F-E

The E and F signals are input into pins 8 and 11 of IC101, the difference is obtained by an internal opamp, and the T.E. signal is output from pin 17.

2-2.Phase Correctors-Drivers

The tracking error signal passes from IC101 pin 17 to IC103 pin 6 to IC103 pin 8 to IC105 pin 6 to IC105 pin 9 and drives the pickup tracking coil.IC105 is the coil driver power amp.

C116,C118,C120 and C121 included in the circuitry are phase correctors which enhance servo stability.

Semi-fixed resistors SVR101, SVR103 and SVR104 are for adjusting servo balance, offset and gain ,respectively.

The Q104 transistor switch is servo on/off. Q105 and Q106 transistor switches are for high frequency band on/off,loop gain switching, etc. and enhance the stability of transient operation when focus is on and during disc acsess. The timing of these switches is determined by IC107 as follows:

TROF(tracking off):IC107 pin 19;FCS(focus search):
IC107 pin 13;TRGL(tracking gain low):IC107 pin 20;
TRHD(tracking high down):IC107 pin 27.

The above signals are output by IC107 in response to commands issued by microprocessor IC112.

2-3.TER Circuit

The TE signal output from IC101 pin 17 is input to IC103 pin 4. After being run through a comparator at the ground level, it is output from IC103 pin 2 and input to IC107 pin 17. The TER signal is one of the switching timing signals mentioned in the previous paragraph.

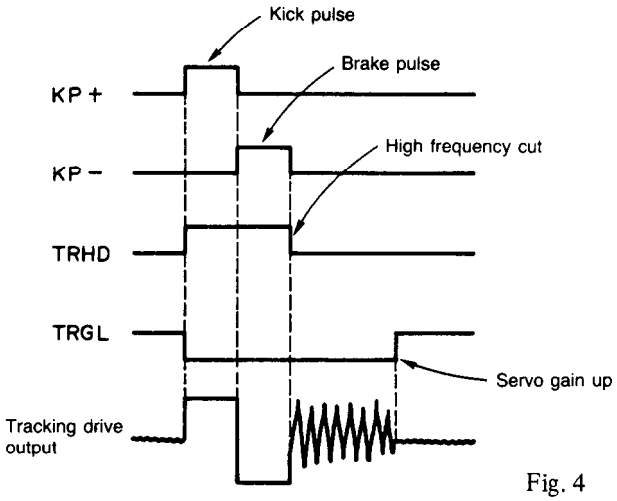


Fig. 4

2-4.Track Kick Circuit

This circuit is used to move the laser beem to a target pit over relatively short distances (approximately 1-100 tracks) during such operations as disc access and cue review. In conjunction with the on/off switching discussed above, it sends positive and negative "kick pulses"(KP +,KP-) to pins 6 and 7 of IC106,Thereby shifting the track coil by the desired amount.

The timing is determined by signals such as the TER signal and HF signal.Fig. 4 illustrates the timing during a typical "kick" operation (forward).

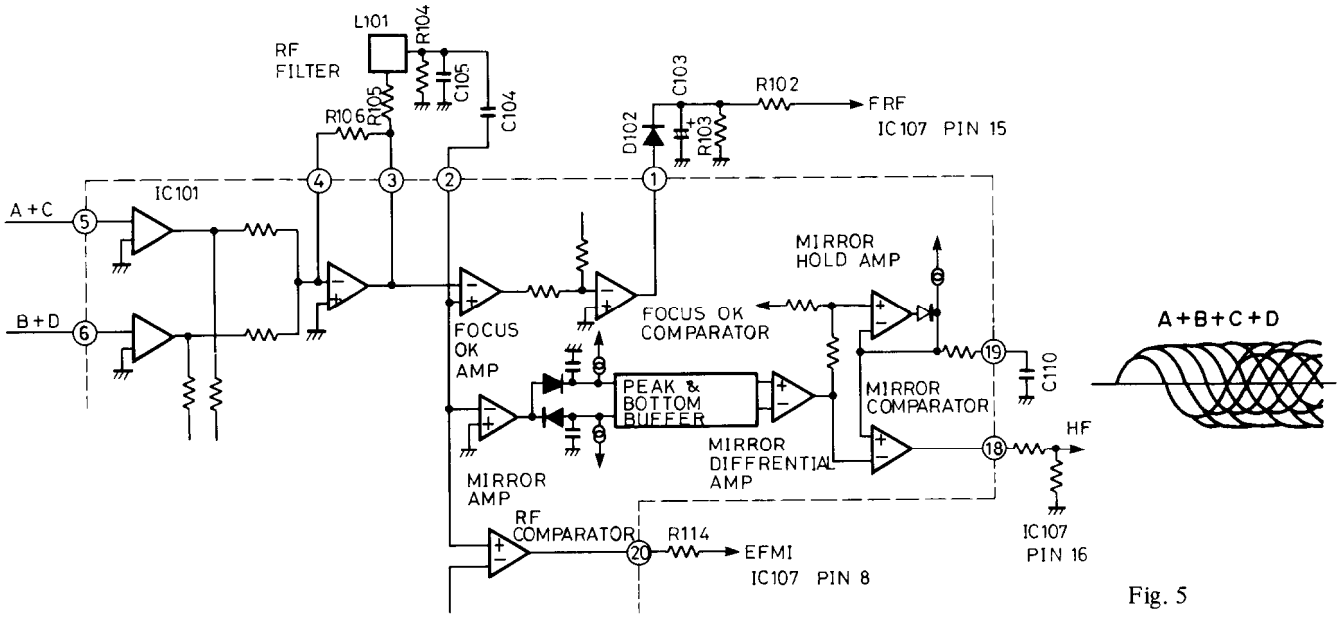


Fig. 5

3.RF Signal

The RF(HF) amplifier block amplifies the RF (HF) data encoded on the disc (in other words the entire output from the four-section photodiode) and sends it to the processing circuit block.In addition, it constantly checks the status of the servo and detects the signals which determine timing.
R.F.(H.F.)=A+B+C+D (Eye-pattern)

3-1.RF amplifier

A + C and B + D signals input to IC101 pins 5 and 6 are added by the opamp in the IC. After amplification by an RF amplifier, the result is output from IC101 pin 3 as the RF signal. RF amplifier gain is determined by R106, external to the IC. The RF signal output from IC101 pin 3 passes through RF filter L101 where noise is removed. It then passes through C104 and is input IC101 pin 2.The RF signal then passes through an RF comparator inside IC101 and is output from pin 20. It is then input to IC107 pin 8 and undergoes further signal processing.

3-2.HF and FRF signals

The RF signal input to IC101 pin 2 is processed by a focus OK aplifier and mirror amplifier in the IC.
The resulting signals are output from IC101 pins 1 and 18 as the FRF and HF signals, respectively. These signals are then input to IC107 pins 15 and 16.
The FRF signal indicates when focus is applied. When high, focus is on. The HF signal detects the "mirror" sections between adjacent disc pits, scratches, etc.
It is used along with the FRF signal to control an array of switch timings during disc access.

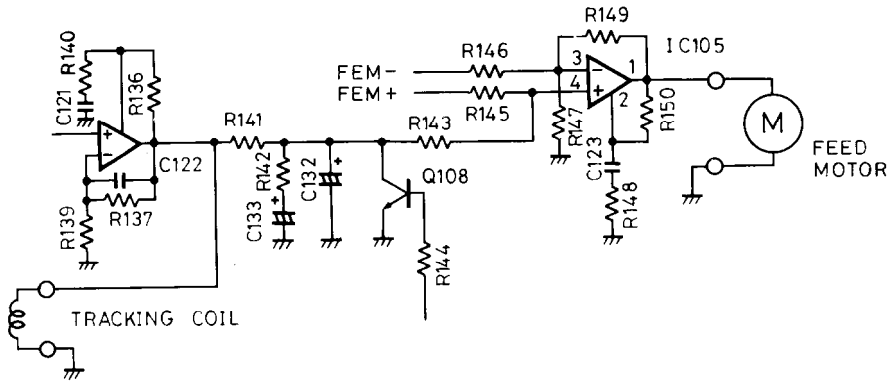


Fig. 6

4.Feed Motor Circuit

This servo circuit moves the entire pickup assembly from the disc's hub to its outer edge, ensuring that the objective lens stays close to the optical axis. C132, C133, etc. remove low-frequency elements from the tracking drive's output. It then passes successively through pins 4 and 1 of IC105 and then drives the feed motor.

Q108 is the transistor that turns the feed motor on and off. It is controlled by the FEED OFF (IC112 pin 22) signal.

Motor fast forward and reverse are initiated by EFM-(feed motor-) and EFM + (feed motor +) signals input into pins 3 and 4 of IC105 for smooth disc access.

5.Disc Motor Servo Circuit

This servo consists of PLL circuit which extracks the clock signal from the RF signal the pickup reads from the disc and a circuit which controls the disc motor based on this clock signal.

5-1.PLL Circuit

The PLL circuit consists of VCO. LPF and a phase compa-rator in IC107 as shown in fig.7.

The 8.6MHz VCO oscillator output is divided in half inside IC107. The phase of the RF signal and waveform-shaped EFM signal edge are compared and the result output through pin 4. When this signal is added to the VCO, the synchronous signal detected by the EFM is matched to the synchronous signal of the internal counter of IC107.

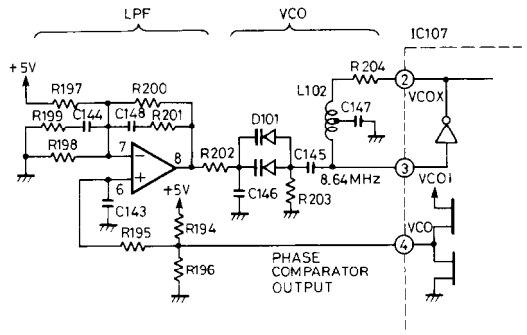


Fig.7

5-2.Disc Motor Circuit

The disc motor is controlled by DM +(disc motor +) and DM -(disc motor -) commands output from pins 11 and 12 of IC107. The opamp IC104 performs phase correction and amplify the signals which are then sent to the disc motor.

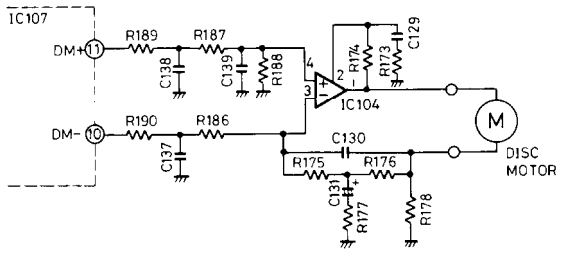


Fig. 8

6.RF Signal Waveform-shaping Circuit

This circuit shapes the RF signal and converts it into a binary value.However, since asymmetry(i.e. lack of symmetry between the top and bottom of the RF siganl which can adversely affect the DC balance) caused by dispersion during disc manufacture cannot be eliminated by AC linking alone, DC components from the EFM (eight to fourteen modulation) signal are fed back after shaping for slice level processing.

7.APC Circuit

By means of feedback from the monitor,this circuit controls the light output due a bad condition resulting from the temperature characteristic of the laser diode.

This circuit is included into the pickup unit.

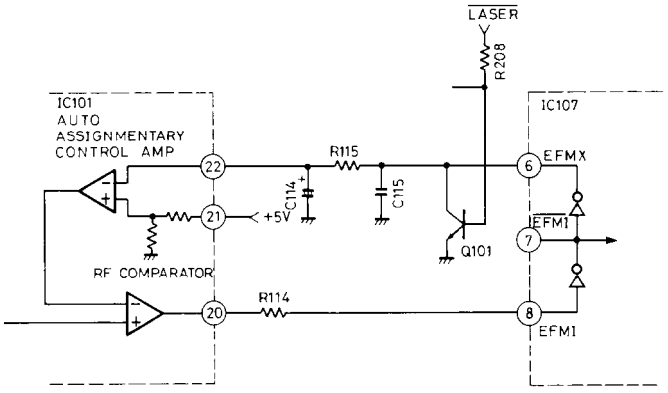


Fig. 9

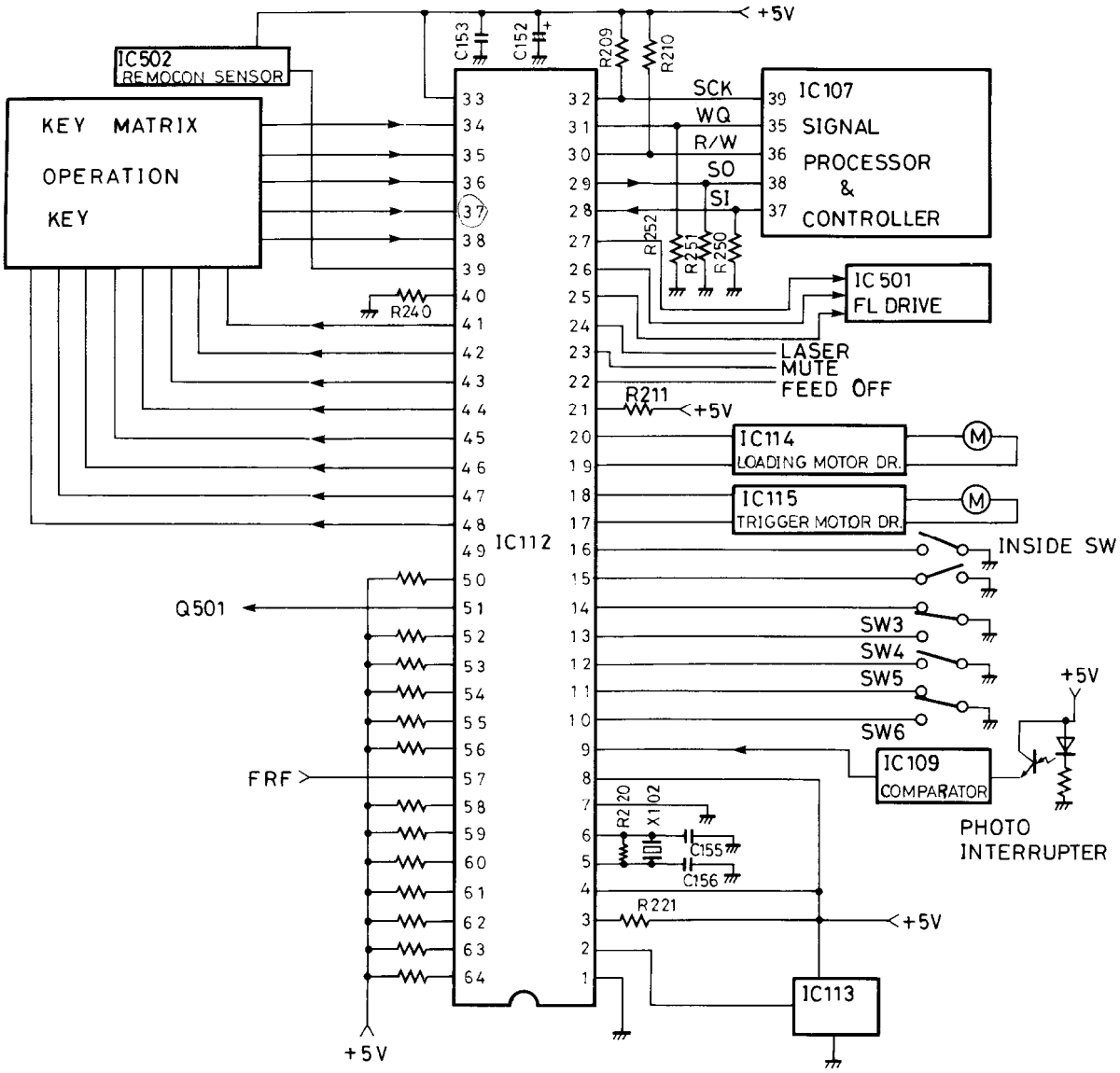


Fig. 10

8.Microprocessor Peripheral Circuit (IC112)

8-1.FL Display and Driver

When data is sent from microprocessor (IC112) pins 25 ~ 27, display operations take place through the micro-processor (IC501) which is used for driving fluoresccent character display tube.

8-2.Key Input Operation

The timing pulse is output by IC112 pins 41 ~48,while an 8× 5 matrix structure for key input is made up of IC501 pins 34 ~38.

8-3.Remote Control Operation

When the output of the optical reception module IC502 (BX1407) is received by the pin 39 of IC112, data code operation takes place internally.

8-4.Servo System control and Sub-code Demodulation (IC112)

Commands to the servo as well as information and subcode data, etc, are trensmitted serially between IC112 and IC107.

SO(serial output)····From IC112 pin 29 to IC107 pin 38

Communicates command data from the microprocessor to the servo system.

8-bit configuration.

SI(serial input)····From IC107 pin 37 to IC112 pin 28

Communicates servo system conditions and sub-code data to the microprocessor.

8 ~11-bit configuration.
SCK(serial clock)····From IC112 pin 32 to IC107 pin 39
Serial data clock. Downshift
R/W(Read/Write)····From IC112 pin 30 to IC107 pin 36
When sending commands from the microprocessor, the signal becomes high-level.
WQ(Write request)····From IC107 pin 35 to IC112 pin 31
When sending commands from the microprocessor, the signal becomes high-level.

8-5.Changer Mechanism Control

IC112 pins 9~15 and 17 ~20 are for mechanism control input and output.
SW1·····Pin 15 detects with L/H whether there is magazine or not.
SW2/3····Pin 14(when L) and Pin 13(when H) input whether the disc is on the turntable or in the magazine (not on the turntable).
SW4·····Pin 12 tells the microprocessor with L/H whether or not there is a disc.
SW5/6····Pin 11(when L) and Pin 10(when H) inform the microporcessor that the trigger is at its lowest level, or,in the opposite case, at the EJECT level.
Also, a detection signal from the photo interrupter is reshaped by IC109 and sent to the DISC SEL pin no. 9.
The inside switch turns on when the pickup is at its innermost circumference.(pin 16 of IC112 is low).
Pins 17 and 18 are ACTIVE LOW with the reverse control signal of the disc select motor.At stop they are both high.
Pins 19 and 20 are ACTIVE LOW with the control signal of the disc load motor.With stop they are both high.

8-6.Other Controls

Pin 24·····With the laser diode control signal.At high level, pickup turns on.
Pin 23·····With the audio muting control signal,active High. At low level,there is output.
Pin 22·····Turns the feed circuit of focus search to off Active high.

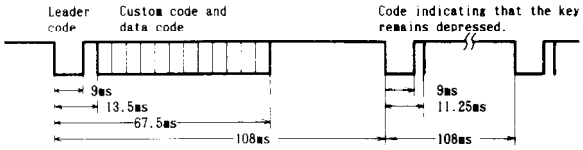


Fig. 11

8. Mechanism Operation

1. Disc Loading Operation

1. Take out the designated disc from the magazine.
2. Put the selected disc on the turntable for chucking. With the above steps, the disc loading process is completed. This operation launches a series of operations set in motion by the gear ring operation of plate side A and plate side B, which are attached at the left and right of the mechanism.
   This series of operations is driven by the DC motor. When the DC motor is running, plate side A operates, and lever gear ring is introduced, upon which plate side B also begins gear ring operation. When plate side A operates in the direction shown in Figure 12, the disc is loaded.

   When the gear ring operation is taking place on plate side A, the lever mechanism of the selected disc in the magazine moves, and the selected disc is brought out of the magazine and is sent to a designated position. (A-Operation of Figure 13) Next, the disc is lowered to the turntable of the CD mechanism section and is chucked. (B-Operation) With this, the loading operation of the disc is finished.

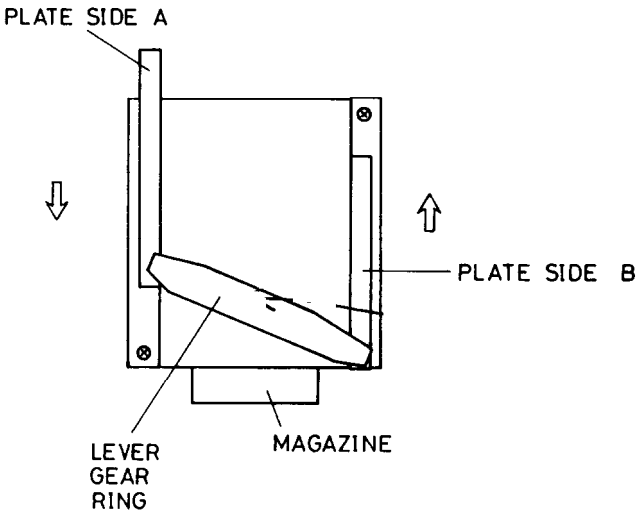


Fig. 12

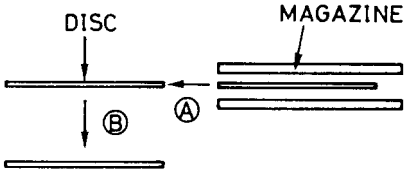


Fig. 13

2. Disc Eject Operation

If plate side A and plate side B are operating in the opposite direction of the disc loading operation, disc eject operation takes place.

When the disc chucking is cancelled, the disc is raised, and returns to a designated slit in the magazine. With this action, the disc eject operation is finished.

3. Disc Select Operation

Disc selection occurs when the base trigger is moved up and down by the DC motor operation. There are six slits corresponding to Nos. 1 ~ 6 of the base trigger. When the DC motor is driven and the special screw rotates, the base trigger is moved up and down. When the sensor find the designated disc slit, the base trigger is brought to the designated disc position.

When this has taken place, disc selection is finished.

4. Magazine Eject Operation

The magazine is held inside the mechanism by a stopper. When the base trigger has been lowered to its lowest position, (When the sensor find the slit for eject) the stopper is pushed down, and the stopper is detached from the magazine. The magazine pops up by means of a spring. When this occurs, the magazine eject operation is finished.

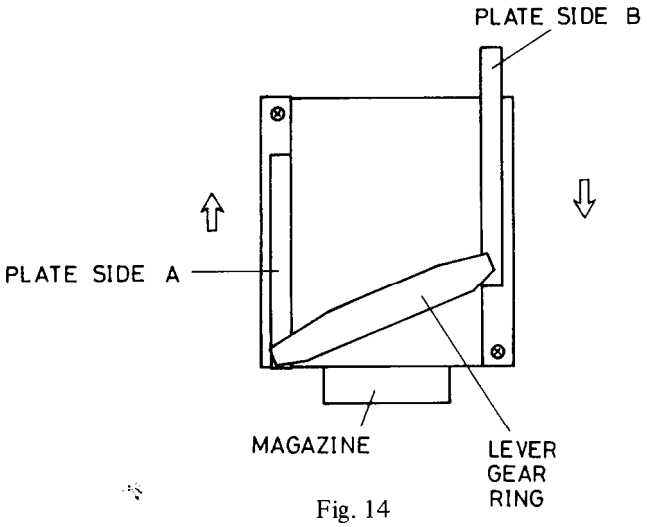


Fig. 14

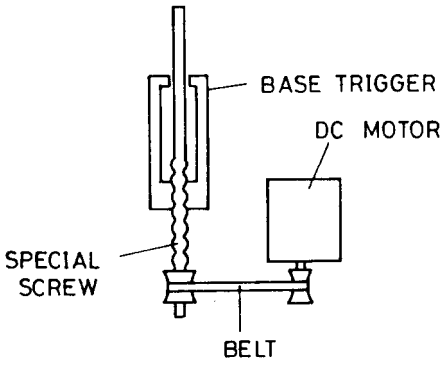


Fig. 15

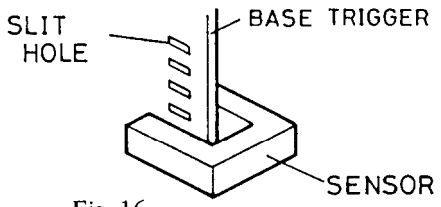
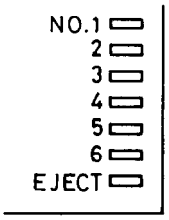


Fig. 16



BASE TRIGGER

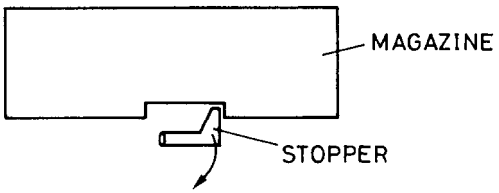


Fig. 17

PARTS LIST

REF.NO.	PART NO.	DESCRIPTION
1	27110452	Front chassis ass'y
2	27211017	Front panel ass'y
3	27215147	Decoration plate
4	27215148	Decoration plate
5	27215149	Decoration plate
6	27301167	Door
7	27301011-1	Top lid
9	27301012-1	Bottom lid
10	27301010	Base ass'y
11	27130488	Bracket
12	27130489	Bracket
13	27130490	Bracket
14	27121160	Back panel <D>
	27121161	Back panel <PX>
15	270280	⚠SR-4K-U,Strainrelief
17	27130491	Bracket
19	27180416	Torsion spring
22	253112A	⚠AS-UC-4,Power supply cord
28	28323538	Knob,power
29	27273110	Joint
30	27270214A	Spacer
32	28140788	Base
33	28323539	Knob
34	28323540	Knob
35	28323541	Knob DISC
36	28323542	Knob DISPLAY
37	28323543	Knob PLAY
38	28323544	Knob MEMORY

REF.NO.	PART NO.	DESCRIPTION
42	27150260	Shielded plate
43	27150261	Shielded plate
44	27150262	Shielded plate
PT1	2300257	⚠NPT-971D,Power transformer <D>
	2300258	⚠NPT-971ADGQ,Power transformer <PX>
PCB1	24505246	Main circuit pc board ass'y
PCB2	24505248	Output terminal pc board ass'y
PCB5	24505247	Display pc board ass'y
SW101	25035295	⚠Power switch
C1	3300001	⚠0.01μF,400V,Capacitor IS
C23	3300005	⚠470pF,400V,Capacitor IS
S1	831430068	3TTW+6B(BC),Tapping screw
S2	838430088	3TTB+8B(BC),Tapping screw
S3	830130069	3TTC+6C(BC),Tapping screw
S4	833430109	3TTP+10C(BC), Tapping screw
S5	834430148	3TTS+14B(BC), Tapping screw
S6	838430068	3TTB+6B(BC),Tapping screw
S7	82143006	3P-6FN(BC),Pan head screw
S8	838440109	4TTB+10C(BC),Tapping screw
	27130523	⚠Protector (Cord clamper) <PX>
	24505210	⚠Voltage selector switch <PX>

Note: <D>:Only 120V model
<PX>:Only PX model

NOTE: THE COMPONENT IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PARTS NUMBER SPECIFIED.

DISASSEMBLING PROCEDURES

Changer Mechanism

Remove the top cover.
Remove the bracket on the front panel.
Detach the 7 connectors leading to the PC board from the mechanism.
Remove screws A and B.
Pull plate side A forward and remove screws C and D.
If plate side A is facing the opposite direction, remove it from screws C and D.

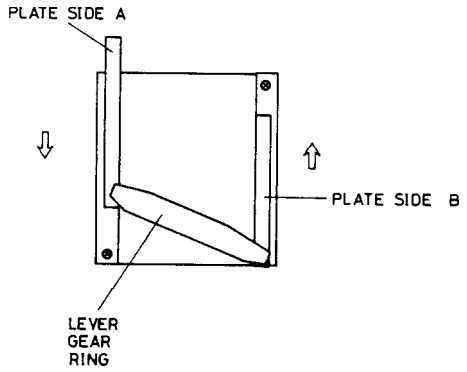


Fig-33

CD Mechanism

Remove the changer mechanism.
Remove the 4 screws holding the bracket mechanism and CD mechanism to the underside of the changer mechanism section.

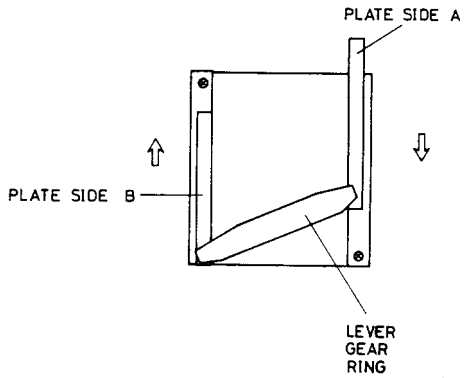
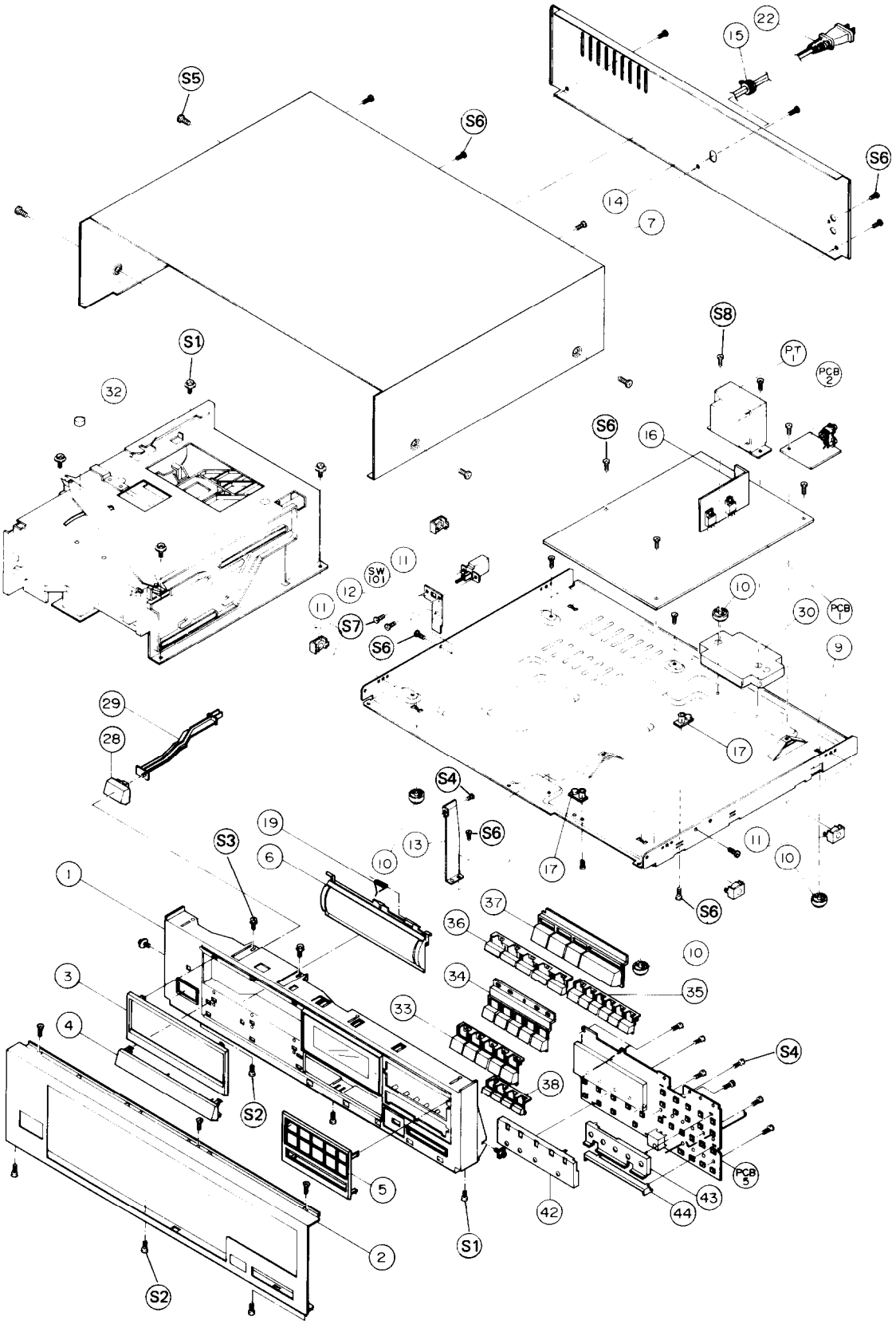
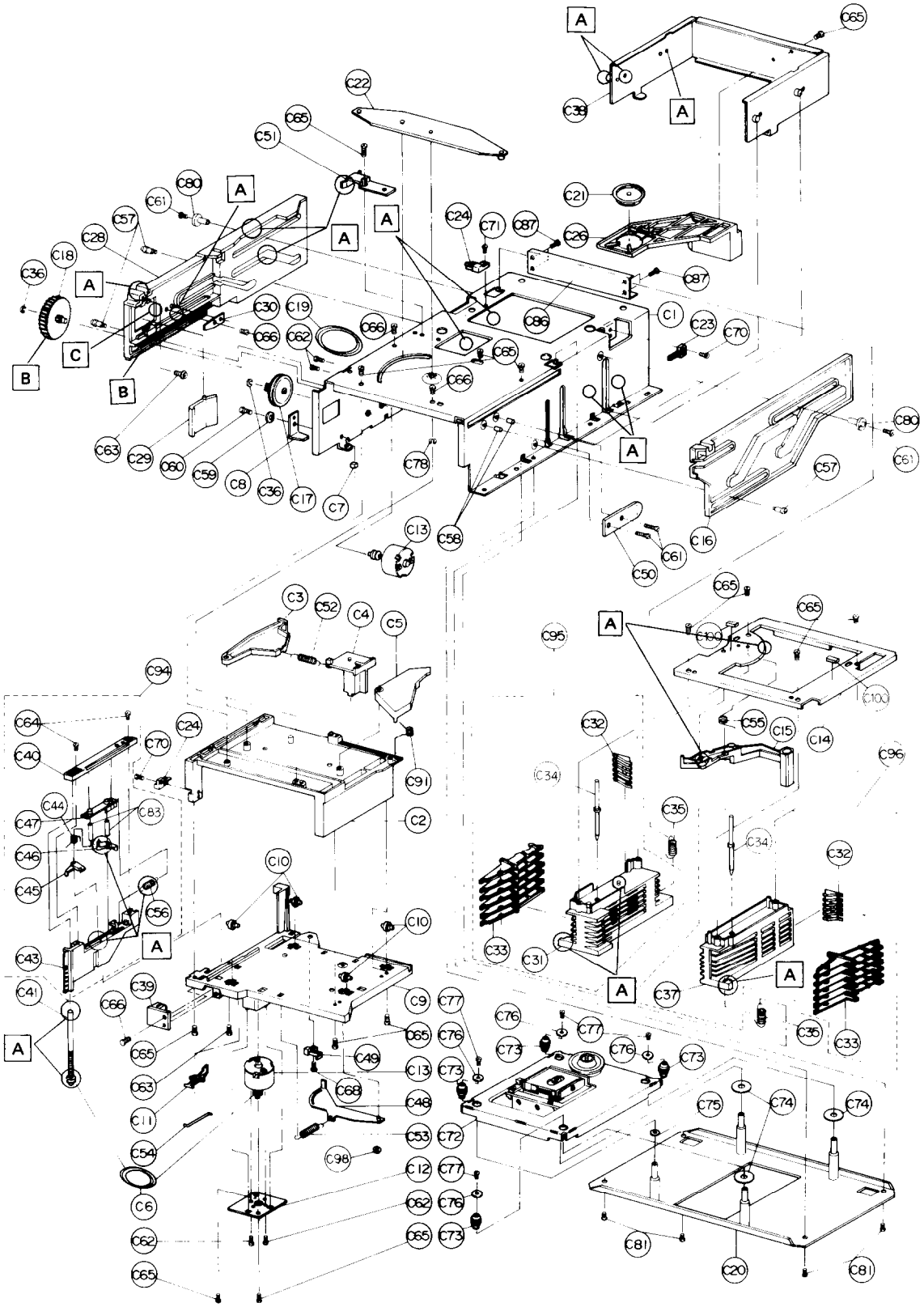


Fig-34

EXPLODED VIEW



MECHANISM EXPLODED VIEW



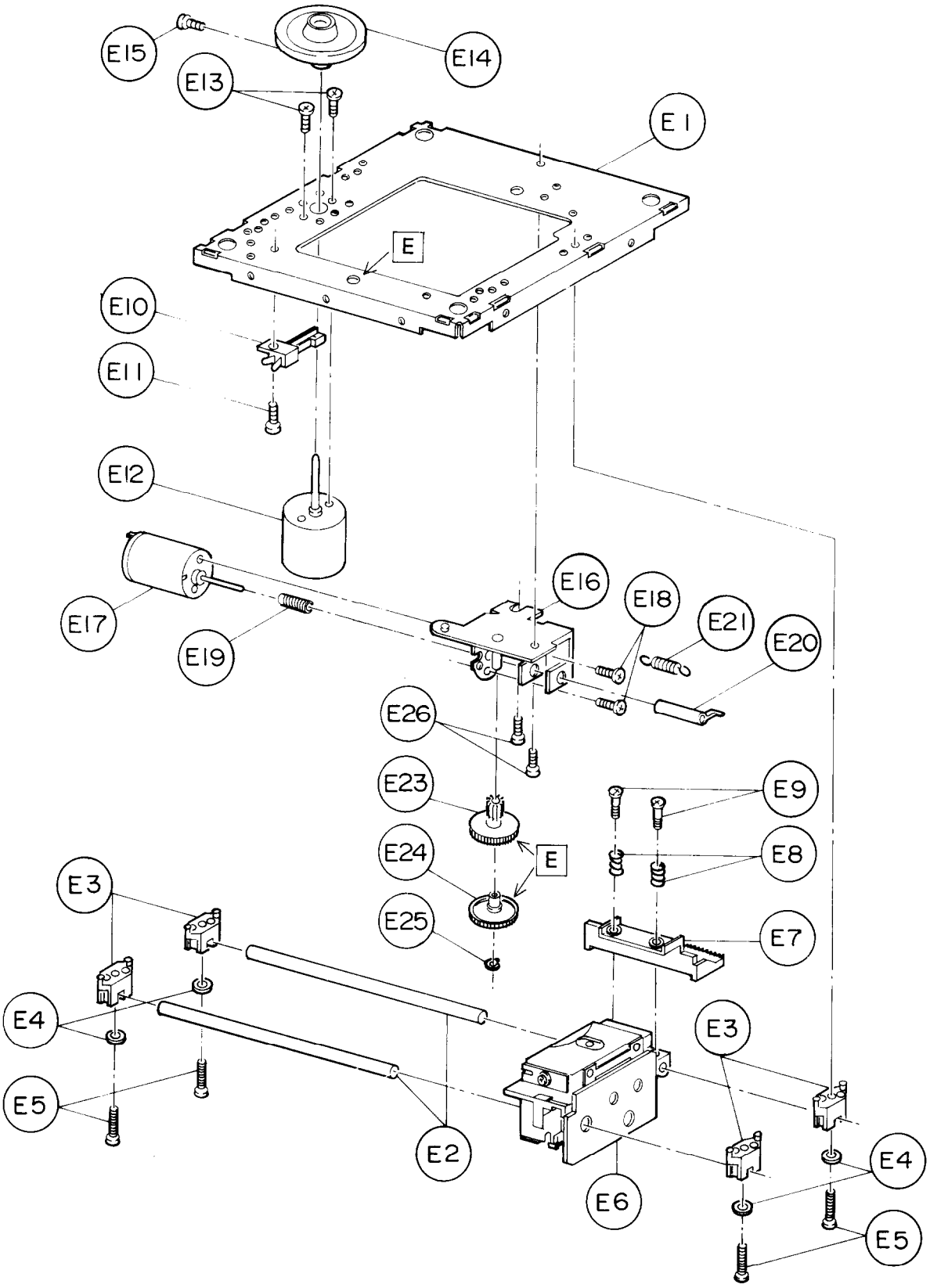
PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
C1	27100142	Chassis
C2	27262450	Plate,upper
C3	27300951A	Lever
C4	27300952A	Arm,slide
C5	27300953	Lever
C6	27300954	Belt
C7	27260234	Bracket,shaft
C8	27300955	Stopper,thrust
C9	27262451-1	Plate,lower
C10	27300956	Roller
C11	27300957	Stopper
C12	24502220	Bracket,motor
C13	24502221 or 24502240	DC motor
C14	27262452	Plate
C15	27300958	Lever,reset
C16	27262453A	Plate,side B
C17	27300959	Pulley
C18	27300960	Gear
C19	27300961	Belt
C20	27130485A	Bracket,mechanism CD
C21	27301168	Fixture,disc
C22	27300962	Lever,gear
C23	24505183	Leafswitch
C24	24505184	Leafswitch
C26	27255002A	Clamper
C28	27262454A	Plate,side A
C29	27300963	Lever
C30	27180342	Plate spring
C31	27301014	Case,lift B
C32	27180343	Plate spring
C33	27300964	Lever, disc center
C34	27300965A	Pin
C35	27180344	Coil spring
C36	24506740	Special washer
C37	27301015	Case,lift A
C38	27130495	Frame
C39	27300966	Sensor
C40	27262456	Plate
C41	24506741	Special screw
C43	27300968-1	Base,trigger
C45	27300969-1	Lever A
C46	27300970-1	Lever B
C47	27262457-1	Plate
C48	27300971	Lever,eject
C49	24505185	Leafswitch
C50	27130486	Bracket B
C51	27130487	Bracket A
C52	27180346	Coil spring
C53	27180347	Coil spring
C54	27180348	Wire spring
C55	27180349	Torsion spring
C57	24506742	Special screw
C58	24506743	Spacer
C59	24506744	Special washer
C60	24506745	Special screw
C61	82143015	3P+15FN(BC),Pan head screw
C62	82142604	2.6P+4F(BC),Pan head screw
C63	830430068	3STC+6B(BC),Tapping screw
C64	833430080	3TTP+8P(BC),Tapping screw
C65	838430088	3TTB+8B(BC),Tapping screw
C66	838430068	3TTB+6B(BC),Tapping screw
C68	838426088	2.6TTB+8B(BC),Tapping screw
C70	833420080	2TTP+8B(BC),Tapping screw
C71	833420068	2TTP+6B(BC),Tapping screw
C72	24506781	DM-15,CD mechanism
C73	24505198	Cushion,damper
C74	8761401610	W4×16F,Washer
C75	8761400810	W4×8F,Washer
C76	8761201005	W2×10F,Washer
C77	82142004	2P+4F(BC),Pan head screw
C78	8930201S	ES-2S,Ring E
C80	27270231	Collar
C81	838430068	3TTB+6B(BC),Tapping screw
C83	27301178	Pin
C86	27130512	Bracket
C87	82142604	2.6P+4F(BC),Pan head screw
C91	24503161	Torsion spring
C94	27301080A	Trigger
C95	27301169	Case,lifter
C96	27301170	case ass'y,lifter
C98	891030	CS-3S,Ring CS
	226033	GP1S52,Photo coupler
	28140888	Sheet
E1	27100180	Chassis
E2	27260283	Shaft,pick-up
E3	27130559	Bracket,shaft
E4	87642607	W2.6×7F(BC),Washer
E5	833426148	2.6TTP+14B(BC),Tapping screw
E6	24505243	Optical pick-up
E7	27301165	Rack
E8	27180415	Compression spring
E9	24506779	Special screw
E10	24505186	Liafswitch
E11	834426068	2.6TTS+6B(BC),Tapping screw
E12	24502239	Motor — CP023
E13	24506782	2 ×2.5,Screw
E14	27301166	Turntable platter
E15	24506784	Special screw
E16	27130561	Bracket ass'y,sled
E17	24502219	DC motor
E18	82142002	2P+2F(BC),Pan head screw
E19	27300985	Worm
E20	27300988	Stopper,thrust
E21	27180359	Coil spring
E23	27300986	Gear,sled
E24	27300987	Gear,worm
E25	24506739	Special washer
E26	82142604	2.6P+4F(BC),Pan head screw
	24505252	6P,Socket ass'y
	260208	Binder

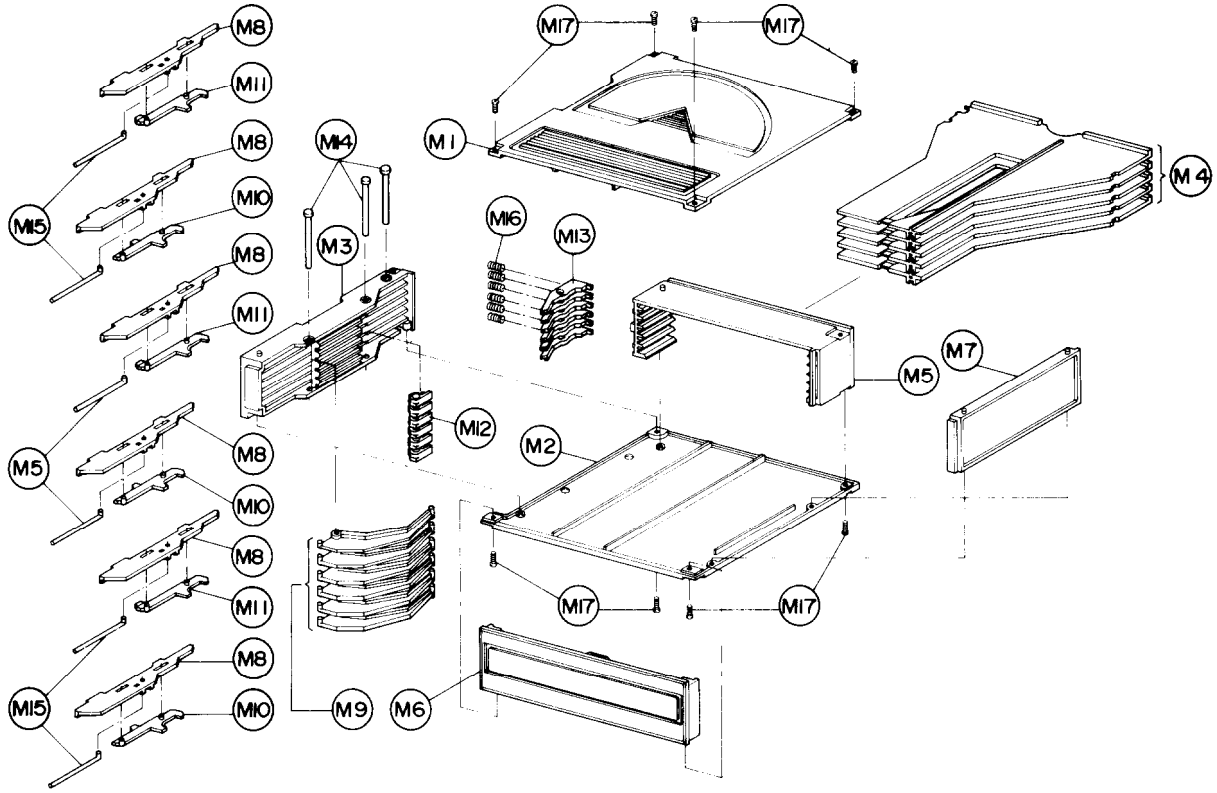
Lubrication

A: DYNAMAX EP-2
B: MOLIKOTE EM50L
C: FLOIL GP-670
E: FLOIL G-31KB

CD MECHANISM EXPLODED VIEW



MAGAZINE EXPLODED VIEW

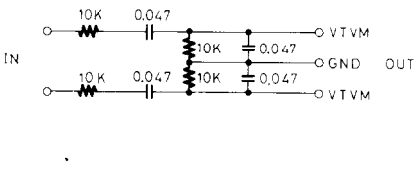


REF. NO.	PART NO.	DESCRIPTION
M1	27300972	Cover, top
M2	27300973	Cover, bottom
M3	27301016	Case, lever
M4	27267510	Guide
M5	27130496	Frame
M6	27300974	Cover, front
M7	27300975	Cover, side
M8	27300976	Lever, mechanical
M9	27300977	Lever, eject
M10	27300978	Lever, manual A
M11	27300979	Lever, manual B
M12	27300980	Cam
M13	27300981	Stopper
M14	27300982	Pin
M15	27180351	Wire spring
M16	27180352	Compression spring
M17	833420068	2TTP+6B(BC), Tapping screw
M18	830430068	3STC+6B(BC), Tapping screw
	29360935	Label, top
	27262447	Plate

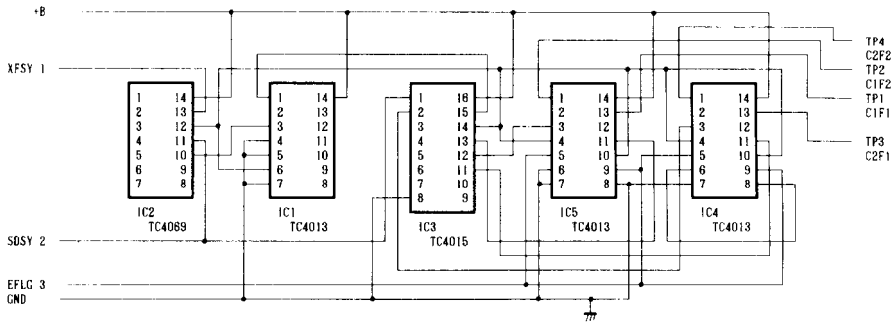
ADJUSTMENT PROCEDURES

Instruments required

Millivolt meter,Oscilloscope,Frequency counter(Use the high impedance probe 10:1),Jitter meter, AF oscillator and 2 channel AC voltmeter.
Grating adjustment driver
Test discs····· YEDS-18 (SONY) and 5A(PHILIPS)
Jigs····· B.P.F.(Refer fig.1),Error rate detector jig(Refer Fig.2)
Sockets···2P(TP101,TP102),5P(TP104), and 9P(TP103)
Resistors 22kohm,220kohm and 100ohm.
Shorted clip



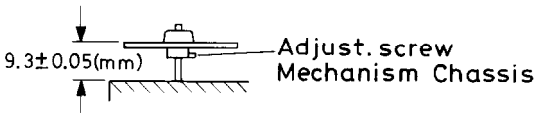
(Fig. 1) B.P.F.



(Fig.2) Error rate detector jig

1.Hight of turntable

Adjust the adjustment screw so that the distance between the turntable and chassis becomes 9.3 ±0.05mm.



(Fig. 3)

2.Disc motor vertical angle check

(1). Load test disc YEDS-18 and initiate play.
Connect a millivolt meter to TP 103 pin 7 (focus actuator drive waveform) and pin 1(ground).
Confirm that the difference between the outermost and innermost is within 300mV.
(2). If the Above condition is not satisfied,adjust the height of the turntable to within a tolerance of 9.2±0.1mm.

3.Grating adjustment

Note:Proceed the this adjustment when the optical pickup has been replaced.
(1). Connect pins 1 and 2 of TP 101 to the oscilloscope X and Y axis, respectively.
Initiate play.
(2). Set the oscilloscope range to 0.1V/div.,10μsec./div. and check the E signal (pin 2) against the synchronization signal.(Refer Photo.1)
(3). If the F synchronization signal is 30 μsec. later than E,continue with the adjustments described in step (5) below.
(4). If you are unable to confirm the F synchronization signal,switch to " track off"(short TP103 pins 6,2 and 1) and perform a temporary adjustment of the point where the synchronization signal appears by turning the grating adjustment screw.
(5). While still in "track off" status, switch the oscilloscope to X-Y and adjust the grating adjustment screw so that a 180 ° phase shift is achieved. (Refer Photo 2)
(6). When you switch back to "track on" and the Lissajous becomes a point,confirm that F (from TP101 pin 1) is 30 μsec. later than E (from TP101 pin 2).

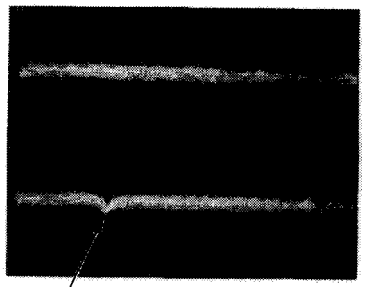


Photo. 1

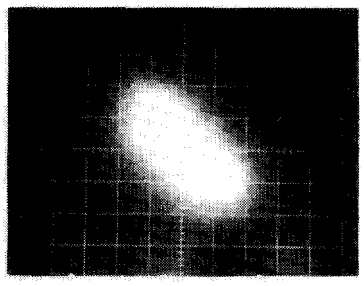


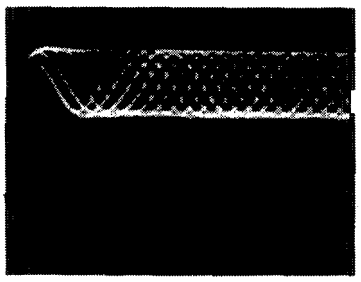
Photo. 2

4.VCO frequency adjustment

Connect the frequency counter to TP VCO.(Use the high impedance probe 10:1)
Adjust L102 so that the frequency counter reading becomes 4.322 ±0.05MHz.

5.Focus balance adjustment

Load test disc YEDS-18 and initiate play.
Connect the jitter meter or oscilloscope to TP RF.
(When use the jitter meter)
Adjust SVR102 so that the jitter meter reading becomes minimum.
(When use the oscilloscope)
Adjust SVR102 so that a clear trace of waveform pattern as shown Photo.3 appear on the oscilloscope.

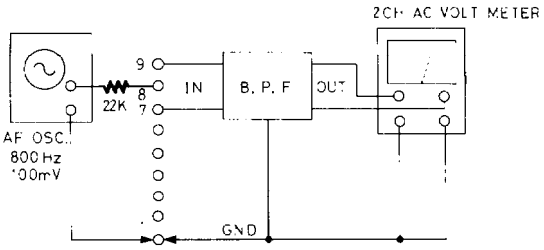


1V/div.
.5μs/div.

Photo. 3

6.Focus gain adjustment

(1). Load test disc YEDS-18 and initiate play.
(2). The band pass filter is passed through and AC voltmeter is connected at the pins 7 and 9 of TP 103.
(3). With the AF oscillator connected at pin 8 of TP 103,800Hz,100mV is passed through 22kohm and input.
(4). Adjust SVR105 so that the output discrepancy between pin 7 and pin 9 of TP 103 is 16 ±1dB.(Pin 7-Pin 9)



1V/div.
5ms/div.

(Fig. 4)

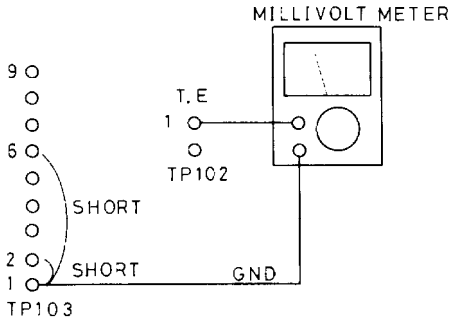
7.Tracking balance adjustment

(1). Load test disc YEDS-18 and initiate play.
(2). Connect the millivolt meter to pin 1 of TP 102.
(3). Short TP 103 pins 1, 2 and 6.
(4). Adjust SVR101 so that the indication of millivolt meter becomes less than ±25mV.

NOTE: If operation outside the above tolerance continues (step 3), servo accuracy will be adversely affected.For this reason,always check the play mode and adjust while watching the time display.

Center : Ground

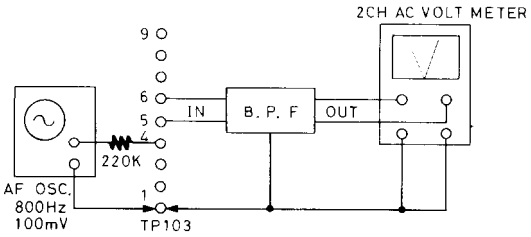
Photo. 4



(Fig. 5)

8.Tracking gain adjustment

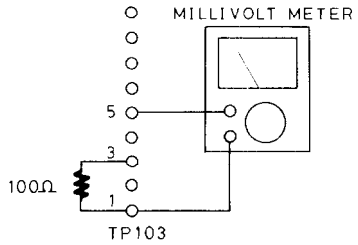
(1). Load test disc YEDS-18 and initiate play.
(2). The band pass filter is passed through and AC voltmeter is connected at the pins 5 and 6 of TP 103.
(3). With the AF oscillator connected at pin 4 of TP 103,800Hz,100mV is passed through 220kohm and input.
(4). Adjust SVR104 so that the output discrepancy between pin 5 and pin 6 of TP 103 is 16 ±1dB.(Pin 6>Pin 5)



(Fig.6)

9.Tracking offset adjustment

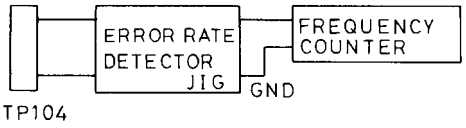
Connect a resistor 100ohm between pins 3 and 1 of TP103.
Connect the millivolt meter to pin 5 of TP 103.
Adjust SVR103 so that the millivolt meter reading becomes ±25mV.



(Fig.7)

10.Philips 5A track 19 noise adjustment

(1). Connect an error rate detector jig to TP 104.
(2). Play the track 19 of Philips 5A.
(3). Connect the error rate detector jig C2F2 to the frequency counter.
(4). Confirm that the counter display is less than 100Hz while track 19 is playing.(Performance is acceptable as long as 100Hz is not exceeded continuously.)
(5). If the level exceeds 100Hz continuously,radjust SVR102 to bring it down below 100Hz.
(6). After readjusting SVR102, readjust the focus gain as well.



(Fig.8)

11.VCO confirmation

(1). Connect the frequency counter to TP VCO.
(2). Confirm that the output frequency is 4.322±0.005MHz.
(3). If it is not within this tolerance,adjust with L102.

1	Ground
2	Tracking feed
3	Tracking offset on
4	TDI
5	Tracking actuator coil drive
6	TWR
7	Focus actuator coil drive
8	FDI
9	FPI

TP103

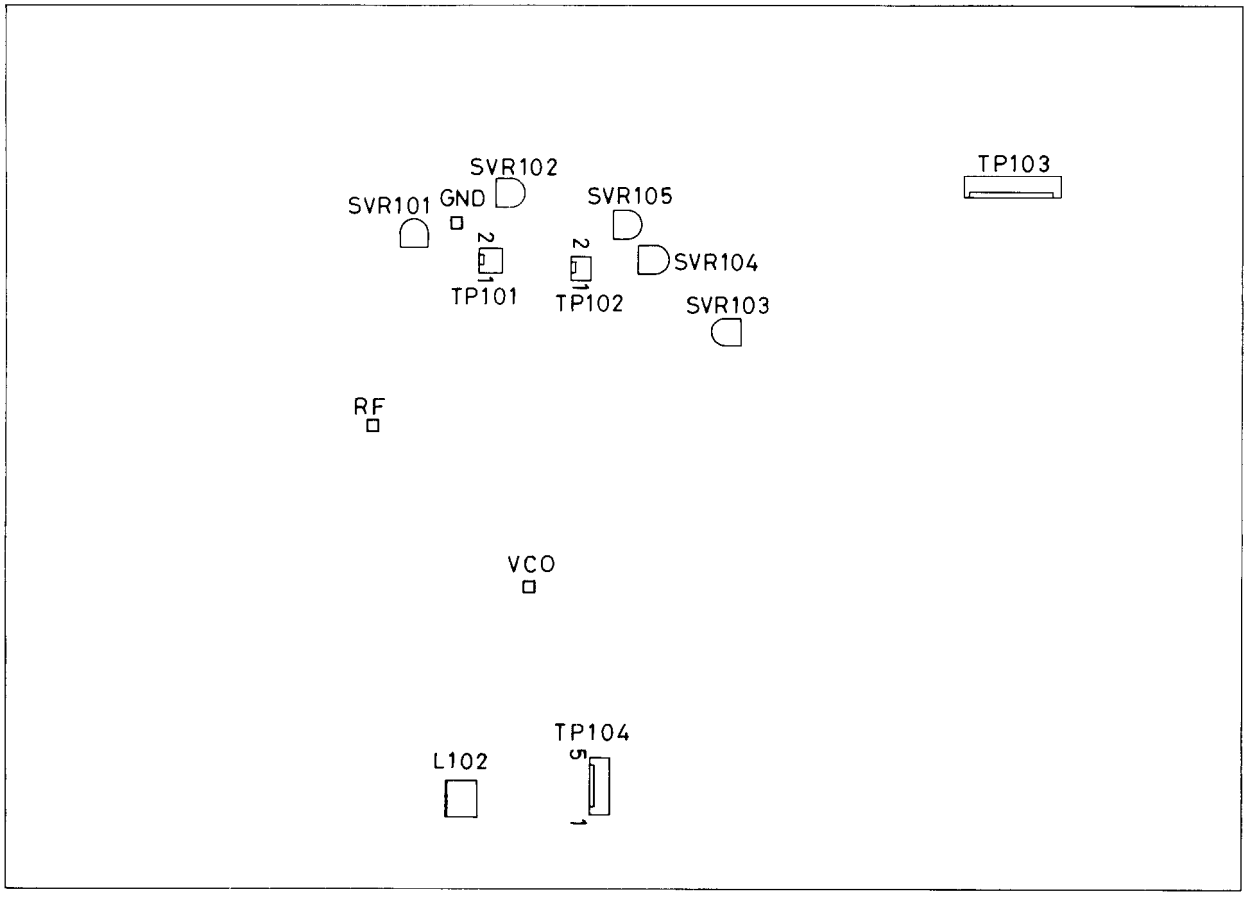
1	F
2	E

TP101

1	TE
2	FE

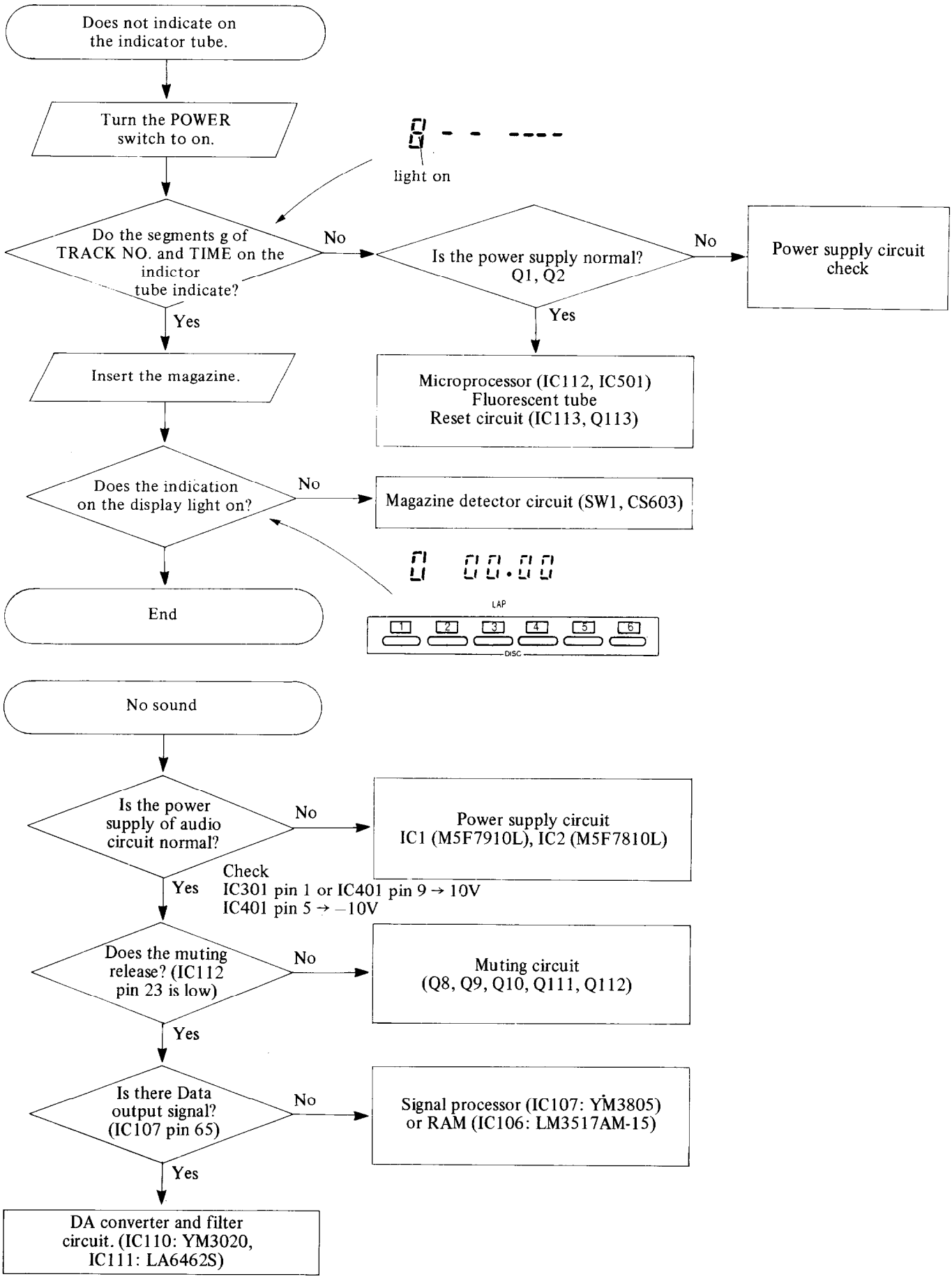
TP102

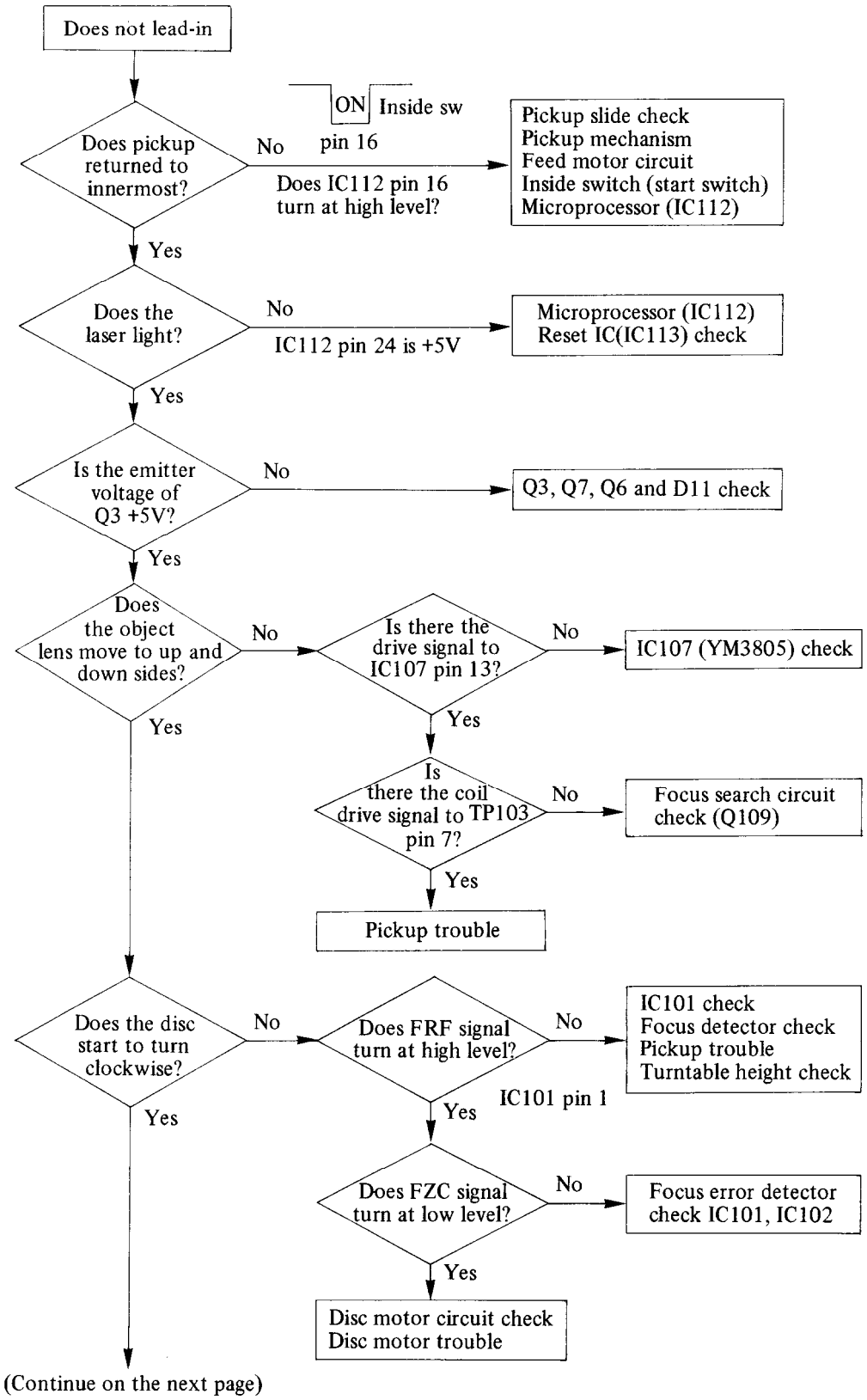
STEP	ITEM	MODE	ADJUST	ADJUST FOR	CONNECTION	OUTPUT INDICATOR
4	VCO	STOP	L102	4.322 ±0.005MHz	TP VCO	Frequency counter
5	FOCUS BALANCE	PLAY	SVR102	Minimum	TP RF	Jitter meter or oscilloscope
6	FOCUS GAIN	PLAY	SVR105	Pin7-Pin9=16±1dB	Fig.3	2ch AC voltmeter
7	TRACKING BALANCE	PLAY	SVR101	Less than ±25mV	Fig.4	Millivolt meter
8	TRACKING GAIN	PLAY	SVR104	Pin6-Pin5=19±1dB	Fig.5	AC voltmeter
9	TRACKING OFFSET	STOP	SVR103	Less than ±25mV	Fig.6	Millivolt meter
10	5A NOISE	PLAY	SVR102	Less than 100Hz	Fig.7	Frequency counter

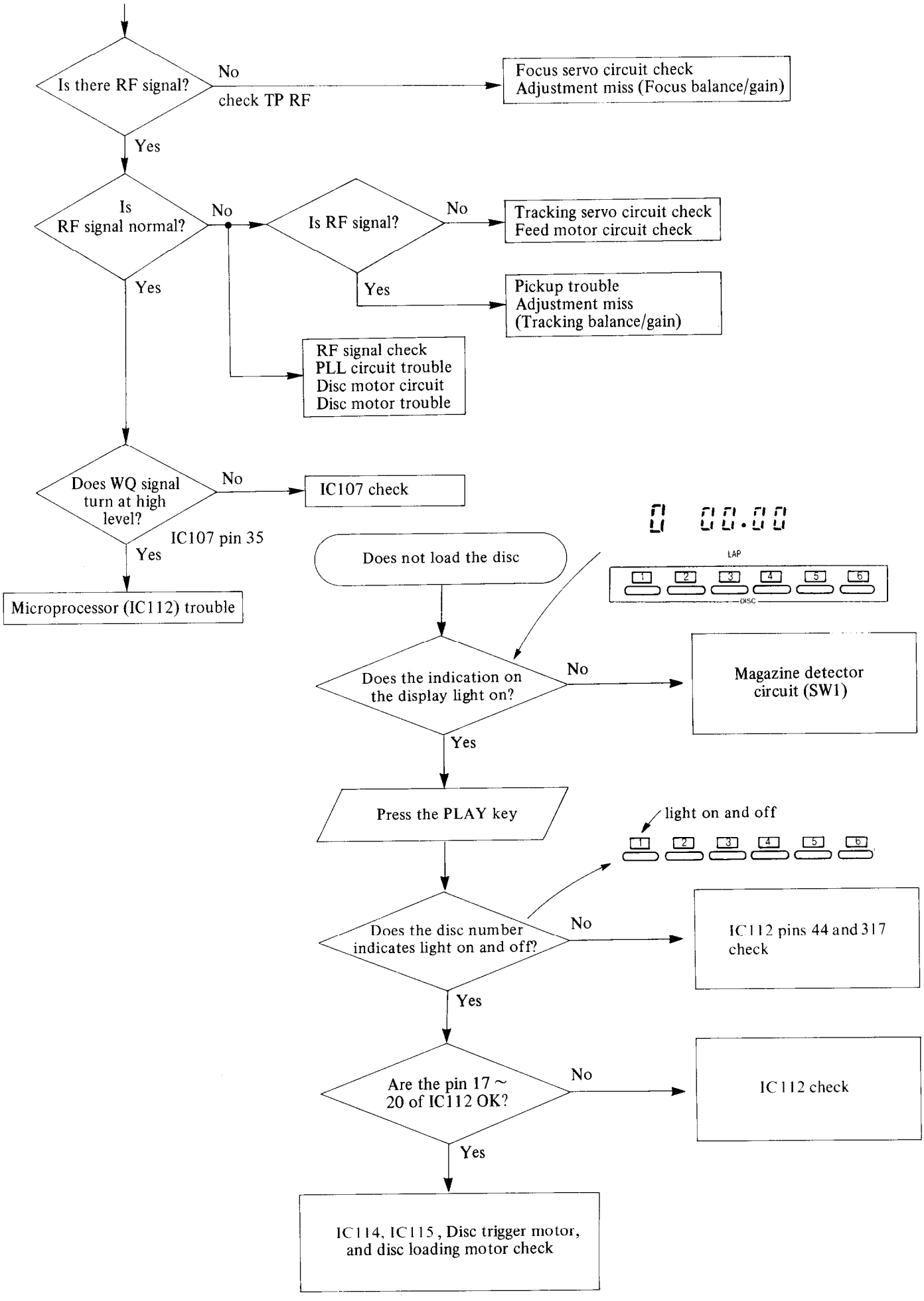


Adjustment point

TROUBLE SHOOTING GUIDE




Does not lead-in
Does pickup returned to innermost?
No
ON Inside sw pin 16
Does IC112 pin 16 turn at high level?
Pickup slide check
Pickup mechanism
Feed motor circuit
Inside switch (start switch)
Microprocessor (IC112)
Yes
Does the laser light?
No
IC112 pin 24 is +5V
Microprocessor (IC112)
Reset IC(IC113) check
Yes
Is the emitter voltage of Q3 +5V?
No
Q3, Q7, Q6 and D11 check
Yes
Does the object lens move to up and down sides?
No
Is there the drive signal to IC107 pin 13?
No
IC107 (YM3805) check
Yes
Yes
Is there the coil drive signal to TP103 pin 7?
No
Focus search circuit check (Q109)
Yes
Pickup trouble
Does the disc start to turn clockwise?
No
Does FRF signal turn at high level?
No
IC101 check
Focus detector check
Pickup trouble
Turntable height check
IC101 pin 1
Yes
Yes
Does FZC signal turn at low level?
No
Focus error detector check IC101, IC102
Yes
Disc motor circuit check
Disc motor trouble
(Continue on the next page)


Is there RF signal?
No
check TP RF
Focus servo circuit check
Adjustment miss (Focus balance/gain)
Yes
Is
RF signal normal?
No
Is RF signal?
No
Tracking servo circuit check
Feed motor circuit check
Yes
Yes
Pickup trouble
Adjustment miss
(Tracking balance/gain)
RF signal check
PLL circuit trouble
Disc motor circuit
Disc motor trouble
Does WQ signal
turn at high
level?
No
IC107 check
IC107 pin 35
Yes
Microprocessor (IC112) trouble
Does not load the disc
LAP
DISC
Does the indication on
the display light on?
No
Magazine detector
circuit (SW1)
Yes
Press the PLAY key
light on and off
Does the disc number
indicates light on and off?
No
IC112 pins 44 and 317
check
Yes
Are the pin 17 ~
20 of IC112 OK?
No
IC112 check
Yes
IC114, IC115, Disc trigger motor,
and disc loading motor check

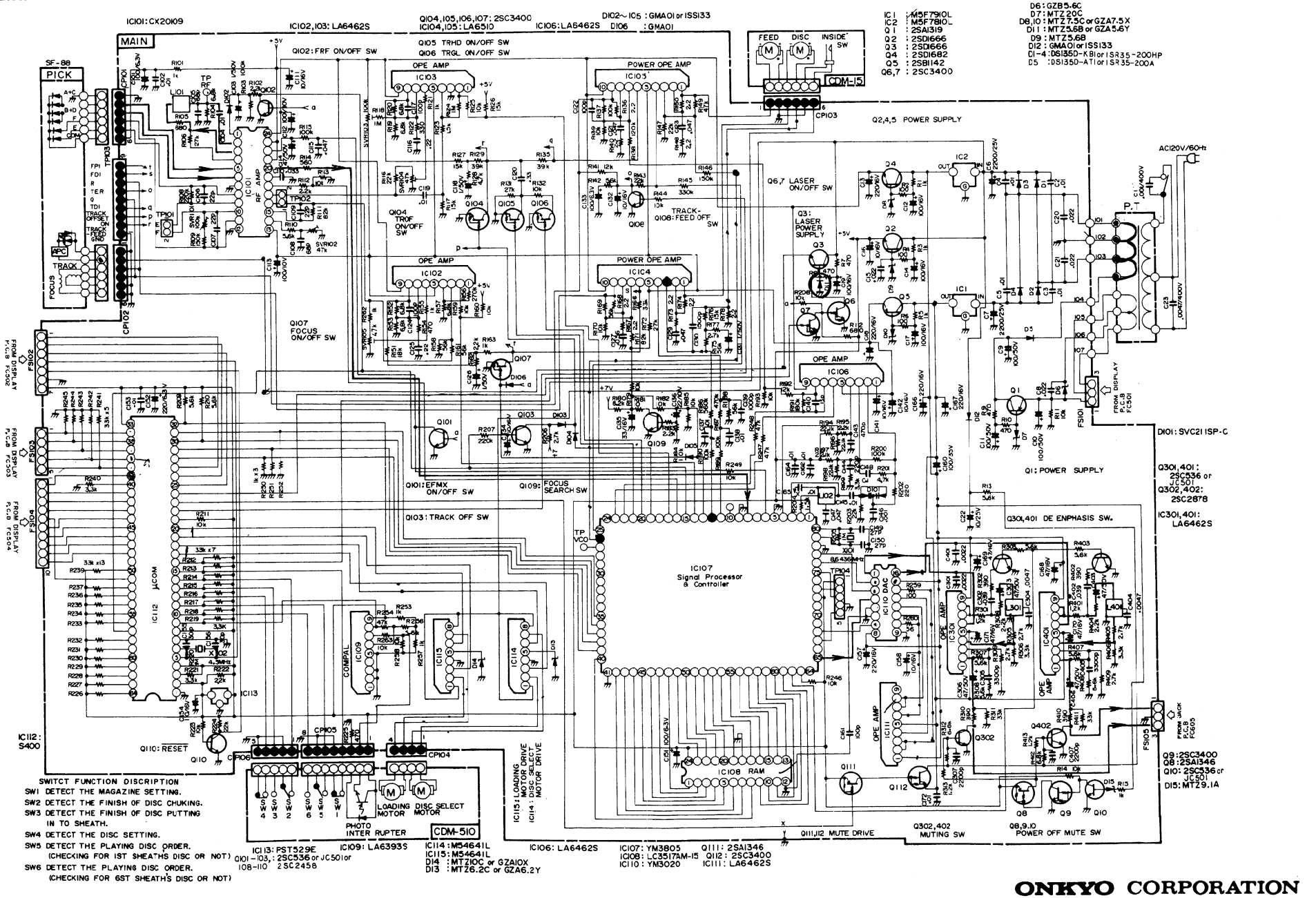
PRINTED CIRCUIT BOARD – PARTS LIST

MAIN CIRCUIT PC BOARD

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
IC1	22240097	M5F7910L
IC2	22240098	M5F7810L
IC101	222886	CX20109
IC102,IC103	22240103	LA6462S
IC104,IC105	22240034	LA6510
IC106	22240103	LA6462S
IC107	222975	YM3805
IC108	22240032	LC3517AM-15
IC109	22240104	LA6393S
IC110	222969	YM3020
IC111	22240103	LA6462S
IC112	22240208	SX400
IC113	22240209	PST529E-2
IC114,IC115	22240101	M54641L
IC301,IC401	22240103	LA6462S
	Transistors	
Q1	2213486	2SA1319-T
Q2,Q3	2213315	2SD1666-S
Q4	2213495	2SD1682-S
Q5	2213505	2SB1142-S
Q6,Q7	2212570	2SC3400
Q8	221243	2SA1346
Q9	2212570	2SC3400
Q10	2210738 or	2SC536-G(AUD) or
	2212485	JC501-Q
Q101-Q103	2210738,	2SC536-G(AUD),
Q108-Q110	2212115,	2SC2458-GR,
	2212485 or	JC501-Q or
	2212486	JC501-R
Q104-Q107	2212570	2SC3400
Q111	221243	2SA1346
Q112	2212570	2SC3400
Q301,Q401	2210738 or	2SC536-G(AUD) or
	2212486	JC501 R
Q302,Q402	2212286	2SC2878-B
	Diodes	
D1-D4	223177	1SR35-200HP
D5	223178 or	DS135D or
	223179	1SR35-200A
D6	224990013	GZB5.6C
D7	2243283	MTZ20C
D8,D10	2243183 or	MTZ7.5C or
	2241011	GZA7.5X
D9	2243152	MTZ5.6B
D11	2243152 or	MTZ5.6B or
	2240952	GZA5.6Y
D12	223180 or	GMA01 or
	223163	1SS133
D13	2243163 or	MTZ6.2C or
	2240972	GZA6.2Y
D14	2243213 or	MTZ10C or
	2241071	GZA10X
D15	2243201	MTZ9.1A
D101	223181	SVC211SP-C,Variable capacitor
D102-D105	223163 or	1SS133 or
	223180	GMA01
D106	223180	GMA01
	X'tal	
X101	3010125	KD1624F0A
	Osc.element	
X102	3010146	CSA4.5MG,Ceramic
	Coils	
L101	232145	P-7PAMN
L102	231135	T-7TA
L301,L401	231136	FB-7G

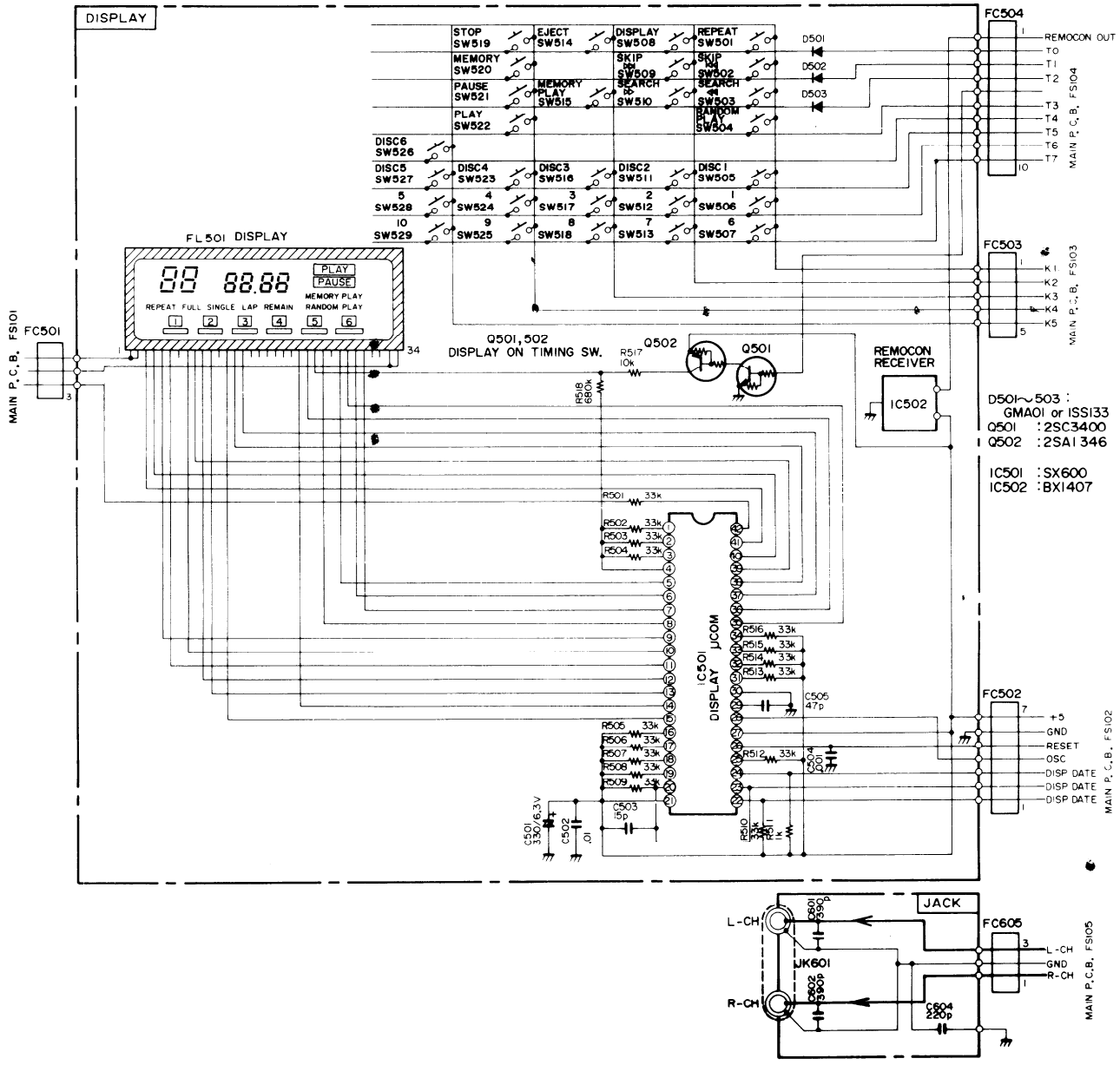
CIRCUIT NO.	PART NO.	DESCRIPTION
	Capacitors	
C6,C7	352752229	2200μF,25V,Elect.
C9-C11	352781019	100 μF,50V,Elect.
C12,C14	352741019	100 μF,16V,Elect.
C13	352742219	220 μF,16V,Elect.
C16	352741009	10μF,16V,Elect.
C17,C19	352741019	100 μF,16V,Elect.
C18	352742219	220 μF,16V,Elect.
C22	352751009	10μF,25V,Elect.
C101	352721019	100 μF, 6.3V,Elect.
C103	352780109	1 μF,50V,Elect.
C111	352741009	10μF,16V,Elect.
C112,C113	352731019	100 μF,10V,Elect.
C114	352784799	0.47μF,50V,Elect.
C118,C126	352780109	1 μF,50V,Elect.
C131	352780109	1 μF,50V,Elect.
C132,C134	352741009	10μF,16V,Elect.
C133	352721019	100 μF, 6.3V,Elect.
C135	352743309	33μF,16V,Elect.
C136	352732209	22μF,10V,Elect.
C141,C142	352741009	10μF,16V,Elect.
C143	370134704	47pF,100V,APS
C151	352721019	100 μF, 6.3V,Elect.
C152	352722219	220 μF, 6.3V,Elect.
C154,C158	352741009	10μF,16V,Elect.
C157	391242217	220 μF,16V,Elect.
C160	352761019	100 μF,35V,Elect.
C166,C167	391242217	220 μF,16V,Elect.
C168-C171	391244707	47μF,16V,Elect.
C301,C401	371122224	2200PF±5%,50V,Mylar
C302,C402	371123934	39000PF±5%,50V,Mylar
C303,C403	392884707	47μF,50V,Low-leakage elect.
C304,C404	371124724	4700PF±5%,50V,Mylar
C305,C405	371123324	3300PF±5%,50V,Mylar
C306,C406	392884707	47μF,50V,Low-leakage elect.
C307,C407	371122224	2200PF±5%,50V,Mylar
	Resistors	
R194	4000114	22.1kohm,1/4W,Metal
R196-R198	4000114	22.1kohm,1/4W,Metal
SVR101,SVR103	5210070	N06HR100KBD,Semi-fixed
SVR102,SVR104	5210068	N06HR47KBD,Semi-fixed
SVR105	5210068	N06HR47KBD,Semi-fixed
	Plugs	
CP101,CP103	25055150	NPLG-6P134
CP102	25055136	NPLG-6P120
CP104	25055148	NPLG-4P132
CP105	25055152	NPLG-8P136
CP106	25055149	NPLG-5P133
TP101,TP102	25055146	NPLG-2P130
TP103	25055153	NPLG-9P137
TP104	25055149	NPLG-5P133
	Sockets	
FS101,FS105	24505196	3P
FS102	24505195	7P
FS103	24505244	5P
FS104	24505245	10P
	Radiator	
	27301171	
	Screws	
	838430089	3TTB·8C(BC),Tapping

SCHEMATIC DIAGRAM



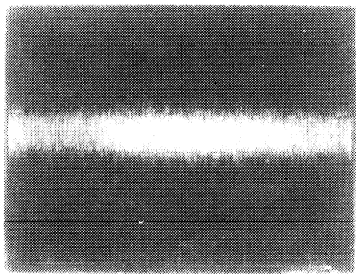
SCHEMATIC DIAGRAM

CONTROL SECTION

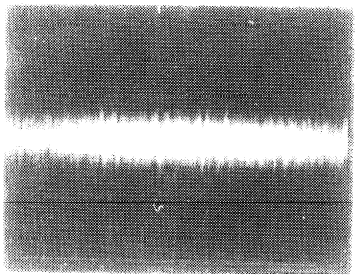


WAVEFORM OF EACH SECTION

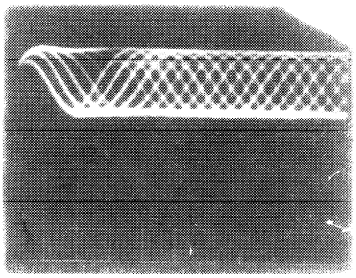
Play the track 2 of test disc YEDS-18.
DC range Center: Ground level



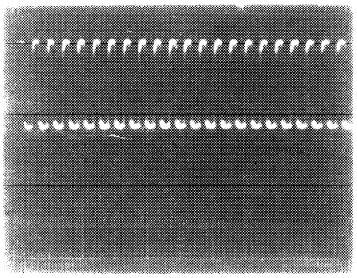
Tracking error signal
TP102 pin 1
0.5V/div.
2ms/div.



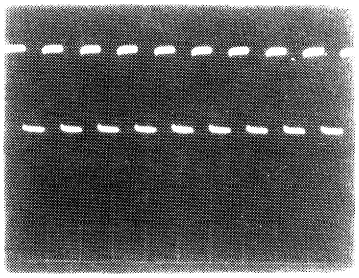
Focus error signal
TP102 pin 2
0.2V/div.
2ms/div.



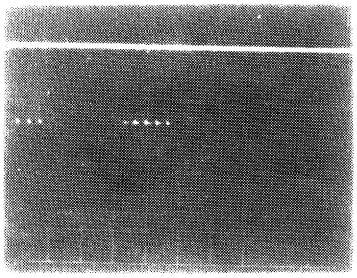
TP RF
1V/div.
.5 μs/div.



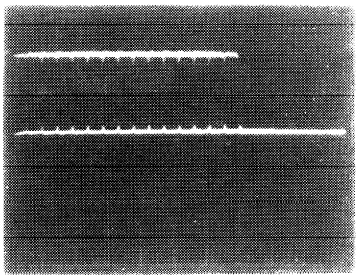
TP VCO
2V/div.
.5 μs/div.



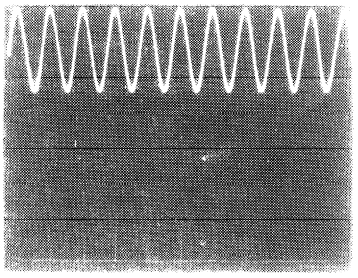
TP104 pin 1
1V/div.
20 μs/div.



FL drive signal
FS102 pin 1
2V/div.
.2ms/div.



DATA waveform
1V/div.
.5 μs/div.



DAC OUTPUT
IC110 pin 16
1V/div.
1ms/div.

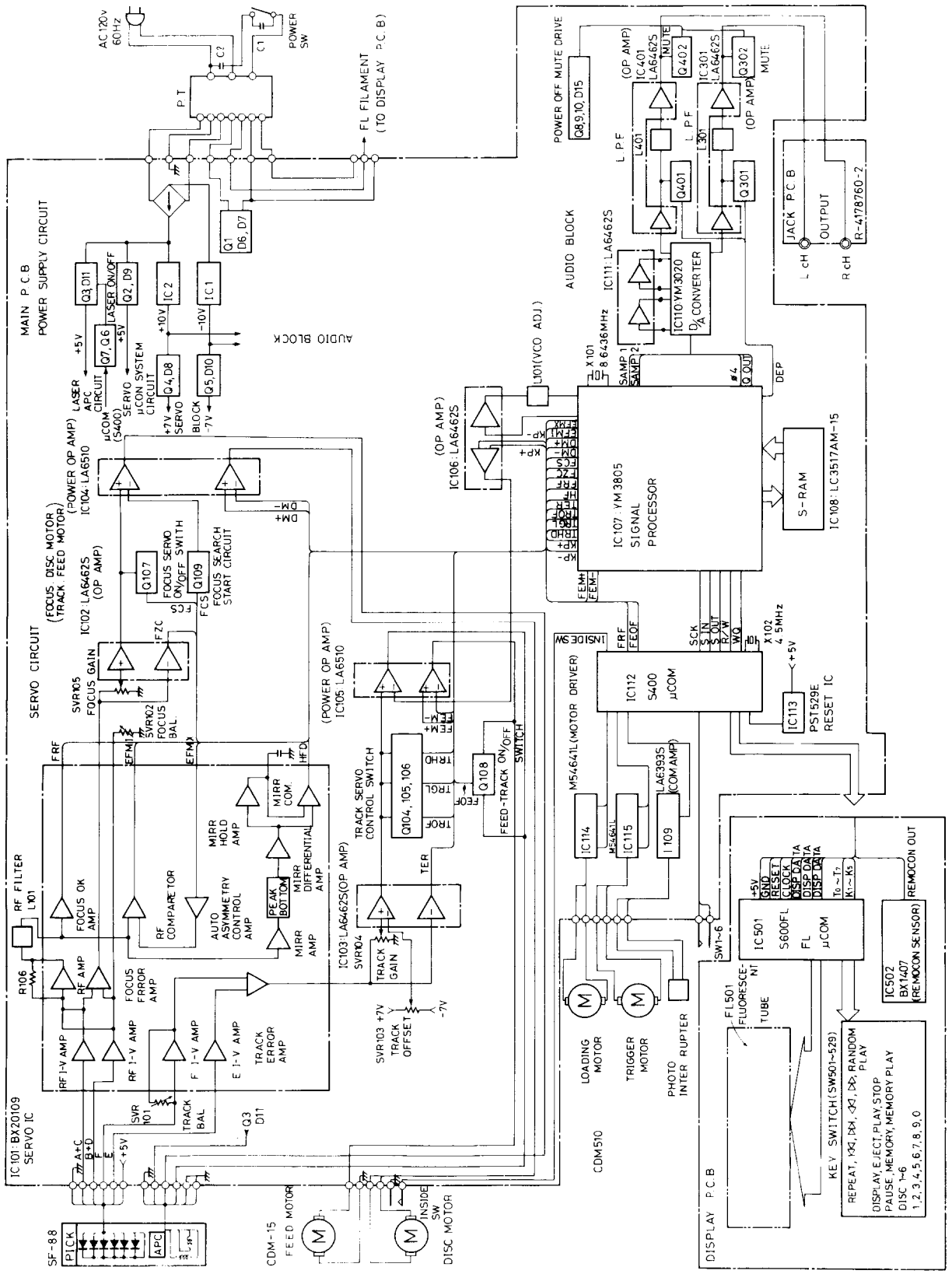
DISPLAY CIRCUIT PC BOARD

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
IC501	22240137	S600FL
IC502	241068	BX1407
	Transistors	
Q501	2212570	2SC3400
Q502	221243	2SA1346
	Diodes	
D501-D503	223163 or	1SS133 or
	223180	GMA01
	Fluorescent tube	
FL501	212068	CPF2331GR
	Capacitor	
C501	352723319	330 μF,6.3V,Elect.
	Switches	
SW501-SW529	25035548	NPS-111-S510,Push

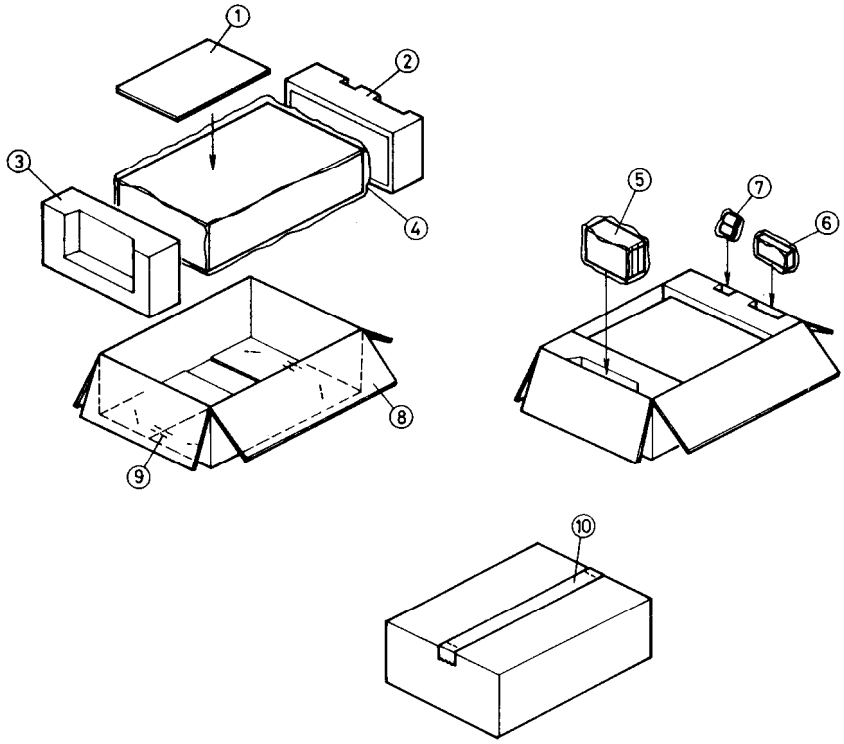
OUTPUT TERMINAL PC BOARD

CIRCUIT NO.	PART NO.	DESCRIPTION
JK601	25000003A	Output terminal
C601,C602	372523914	390pF ±5%,50V,Styrol capacitors

BLOCK DIAGRAM



PACKING VIEW



REF. NO.	PART NO.	DESCRIPTION
1	29341319	Instruction manual
	29365019	Warranty card <D>
	29365021	Warranty card <PX>
	29358002F	Service station list
	2010098	Connection cord
	29360936	Label INDEX for magazine
	25055380	Conversion plug <PX>
	29100005A	240 ×320mm,Poly bag
2	29091191	Pad R
3	29091192	Pad L
4	29100049	570 ×500mm,Poly bag
5	24506732	Magazine
6	24140128	RC-128C,Remote controller
7	3010054	UM-3,Two batteries
8	29051764	Master carton box <D>
	29051765	Master carton box <PX>
9	282301	Sealing hook
10	260012	Damplon tape

Note: <D>:Only U.S.A. model
<PX>:Only PX model

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PN 0M3306 NS807 Printed in J